Running head: IMPACT OF VIETNAM ERA VETERANS ON INPATIENT CARE

The Future Impact of Vietnam Era Veterans on Inpatient Acute Care and Mental Health Product Lines at a Veterans Affairs Medical Center

A Graduate Management Project

Submitted to the Faculty of

The U.S. Army-Baylor University

Graduate Program in Healthcare Administration

By

Mr. Robert O. Parker

June 20, 2000

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
20 JUN 2000	**Final**	**Jul 2000 - Jul 2001**

4. TITLE AND SUBTITLE
The Future Impact of Vietnam Era Veterans on Inpatient Acute Care and Mental Health Product Lines at a Veterans Affairs Medical Center

5a. CONTRACT NUMBER
5b. GRANT NUMBER
5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Robert O. Parker

5d. PROJECT NUMBER
5e. TASK NUMBER
5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
South Texas Veterans Health Care System Audie L. Murphy Division San Antonio, TX

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
US Army Medical Department Center and School Bldg 2841 MCCS-HRA (US Army-Baylor Program in HCA) 3151 Scott Road, Suite 1412 Fort Sam Houston, TX 78234-6135

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
38-01

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT
Over the years, South Texas Veterans Health Care System (STVHCS) has increased outpatient care; as a result, bed days of care (BDOC) decreased over the last ten fiscal years. Admissions, however, only decreased over the first eight-year period. In FY 1999 and FY 2000, there was a noticeable increase in admissions. The Chief of Staff questioned whether the recent increases in the number of admissions were due to the increased utilization of Vietnam Era Veterans (VEV). He also was interested in knowingwhat the likely impact and affect on utilization, admissions, BDOC and cost for treatmentof VEV over the next 5 years. This retrospective study uses descriptive statistics, inferential statistics, and trend analysis to observe, describe, explain, predict, test, and evaluate hypotheses associated with the relationship between non-VEV and VEV admissions. The results from this will be used to assist in developing a forecasting methodology using a best curve fit model.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**103**	

ACKNOWLEDGMENTS

This study could not have been accomplished without the assistance and guidance of the following individuals.

Richard Bauer, M.D.
Chief of Staff
South Texas Veterans Health Care System

Louis DeNino, Ph.D.
Network Planner
VISN 17

Rosie Perez
DSS Computer Specialist
South Texas Veterans Health Care System

ABSTRACT

Over the years, South Texas Veterans Health Care System (STVHCS) has increased outpatient care; as a result, bed days of care (BDOC) decreased over the last ten fiscal years. Admissions, however, only decreased over the first eight-year period. In FY 1999 and FY 2000, there was a noticeable increase in admissions. The Chief of Staff questioned whether the recent increases in the number of admissions were due to the increased utilization of Vietnam Era Veterans (VEV). He also was interested in knowing what the likely impact and affect on utilization, admissions, BDOC and cost for treatment of VEV over the next 5 years.

This retrospective study uses descriptive statistics, inferential statistics, and trend analysis to observe, describe, explain, predict, test, and evaluate hypotheses associated with the relationship between non-VEV and VEV admissions. The results from this will be used to assist in developing a forecasting methodology using a best curve fit model.

TABLE OF CONTENTS

TABLE OF TABLES …… Page ii
TABLE OF FIGURES …….. Page iv
INTRODUCTION ..……. Page 2
Conditions Which Prompted the Study and Statement of the Problem. Page 3
Application to the Veterans Healthcare System …… Page 4
Background ……... Page 4
LITERATURE REVIEW ……. Page 5
The Decline of Bed Days of Care in the VHA …….. Page 6
Creation of Product Lines …….. Page 8
Vietnam Era Veteran (VEV)…….. Page 9
Conditions and Program That Will Effect VEV Utilization ……. Page 10
Mental Health and the VEV …….. Page 10
Comorbidity and the VEV ……. Page 13
Decline of the Veteran Population …… Page 14
Age and the VEV ……... Page 15
METHODS AND PROCEDURES …….. Page 16
Census Data ……... Page 17
Reliability and Validity ……. Page 21
Costs Methodology …… Page 22
Descriptive Analysis Methodology_…….…….. Page 25
Trend Analysis Method ……. Page 31
Forecasting Method ……... Page 31
FINDINGS AND DISCUSSION ……..…… Page 34
Descriptive Statistics ……. Page 34
Graphic Comparison of Prediction Equations ……... Page 36
Inferential Statistics ……... Page 36
Utilization Trend Analysis …….…… Page 37
Cost Trend Analysis …….. Page 39
Admissions Forecasting ……. Page 40
BDOC Forecasting ……. Page 41
Inverse Log Forecast Compared to VA Forecast Study …… Page 42
Cost Forecasting ……. Page 43
CONCLUSION …….. Page 46
RECOMMENDATIONS …….. Page 47
REFERENCES ..…… Page 49
FIGURES ……... Page 56

TABLE OF TABLES

Table 1: STVHCS Total BDOC, Number of Patients, Percentage of Bed Utilization, and Available Beds ……..... Page 3

Table 2: Veterans Health Administration's Hospital Available Beds and Accumulated Patient Bed Days of Care by Fiscal Year. ……Page 7

Table 3: STVHCS ALMD Acute Care and Mental Health Product Line BDOC, Number of Patients, Percentage of Bed Utilization, and Available Beds by Fiscal Year ……Page 9

Table 4: STVHCS ALMD Census Data Collected on Medicine, Surgery, and Mental Health Services. …….. ……Page 18

Table 5: STVHCS ALMD Census Data Percentage Calculations for Medicine, Surgery, and Mental Health Services. ……..…Page 19

Table 6: STVHCS ALMD Census Data Collected on Acute Care and Mental Health Product Lines Combined. ……..Page 20

Table 7: STVHCS ALMD Census Data Percentage Calculations for Acute Care and Mental Health Product Lines Combined. ……Page 20

Table 8: STVHCS ALMD Costs Data for Medicine, Surgery, and Mental Health Services. ……Page 24

Table 9: STVHCS ALMD Costs Data for the Acute Care and Mental Health Product Lines Combined. …….…..…...Page 25

Table 10: SPSS Computer Data Files for Fiscal Year Number to Acute Care and Mental Health Product Lines Combined Admissions Ratios. ……..……. Page 27

Table 11: SPSS Descriptive Statistics Regression Results and Inferential Hypothesis Tests of Acute Care and Mental Health Product Lines Combined VEV Admissions Ratios and Fiscal Year Number. …….. Page 28

Table 12: SPSS Correlation Matrices. ……. Page 29

Table 13: SPSS Regression Analysis. ……. Page 30

Table 14: Represents Medicine Service VEV Forecasted Admissions (*t* = 11 Through 15 for FY 2001 Through FY 2005 Using a Inverse Log Curve Equation). ……..Page 34

TABLE OF TABLES
(Continued)

Table 15: SPSS Descriptive Statistics for Fiscal Year Number to Acute Care and Mental Health Product Lines Combined Admissions Ratios. …….. Page 35

Table 16: SPSS Regression Results and Inferential Hypothesis Tests of Acute Care and Mental Health Product Lines Combined VEV Admissions Ratios and Fiscal Year Number. ……..Page 36

Table 17: STVHCS ALMD Actual (FY 2000) and Forecasted VEV Admissions (FY 2001 – FY 2005), Used to Forecast Cost Per VEV Admission and Total VEV Cost by Services and Combined Total for FY 2001 – FY 2005. ……..…Page 44

Table 18: STVHCS ALMD Actual (FY 2000) and Forecasted Total Admissions (FY 2001 – FY 2005), Used to Forecast Cost Per Total Admission and Total Cost by Services and Combined Total for FY 2001 – FY 2005. ……..…Page 45

TABLE OF FIGURES

Figure 1: SPSS Frequency Distribution (Histograms). ……Page 56

Figure 2: Graphic comparison of least-square regression. ……..Page 57

Figure 3: Calculations required to fit inverse log curve to Medicine Service VEV admissions. ……..…Page 58

Figure 4: Percent of variance in the Acute Care and Mental Health Product Lines combined admissions ratios accounted for by fiscal year. …….…...Page 59

Figure 5: STVHCS ALMD Acute Care and Mental Health Product Lines combined percentage of bed utilization, VEV percentage of BDOC, and facility bed totals for FY 1991 through FY 2000. ……Page 60

Figure 6: STVHCS ALMD Acute Care and Mental Health Product Lines combined percentage of VEV BDOC compared to total cumulated BDOC. ……Page 61

Figure 7: STVHCS ALMD percentage of bed utilization by services. ….. Page 62

Figure 8: STVHCS ALMD VEV average age by services and the Acute Care and Mental Health Product Lines combined. ……Page 63

Figure 9: STVHCS ALMD Acute Care and Mental Health Product Lines combined admissions. …… Page 64

Figure 10: STVHCS ALMD Medicine Service VEV admissions compared to non-VEV admissions. ……. Page 65

Figure 11: STVHCS ALMD Surgery Service VEV admissions compared to non-VEV admissions. …….…… Page 66

Figure 12: STVHCS ALMD Mental Health Product Line VEV Admissions compared to non-VEV admissions. ……. Page 67

Figure 13: STVHCS ALMD VEV admissions compared to non-VEV admissions ratios. …….……... Page 68

Figure 14: STVHCS ALMD Acute Care and Mental Health Product Lines combined BDOC. ……...Page 69

TABLE OF FIGURES
(Continued)

Figure 15: STVHCS ALMD Medicine Service BDOC. ……...Page 70

Figure 16: STVHCS ALMD Mental Health BDOC. ……....Page 71

Figure 17: STVHCS ALMD Surgery Service BDOC. ……. Page 72

Figure 18: STVHCS ALMD Acute Care and Mental Health Product Lines combined total VEV admissions and total VEV costs. …… Page 73

Figure 19: STVHCS ALMD Acute Care and Mental Health Product Lines combined VEV admissions and average costs per VEV admissions. ……. Page 74

Figure 20: STVHCS ALMD Medicine Service VEV admissions and average costs per VEV admissions. …… Page 75

Figure 21: STVHCS ALMD Mental Health VEV admissions and average costs per VEV admissions. …… Page 76

Figure 22: STVHCS ALMD Surgery Service VEV admissions and average costs per VEV admissions. …… Page 77

Figure 23: STVHCS ALMD Acute Care and Mental Health Product Lines combined admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …….. Page 78

Figure 24: STVHCS ALMD Medicine Service admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …… Page 79

Figure 25: STVHCS ALMD Surgery Service admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …… Page 80

Figure 26: STVHCS ALMD Mental Health admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …… Page 81

TABLE OF FIGURES
(Continued)

Figure 27: STVHCS ALMD Acute Care and Mental Health Product Lines combined BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). ……. Page 82

Figure 28: STVHCS ALMD Medicine Service BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …… Page 83

Figure 29: STVHCS ALMD Surgery Service BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …… Page 84

Figure 30: STVHCS ALMD Mental Health BDOC (Actual FY 1991– FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation). …….. Page 85

Figure 31: STVHCS ALMD Acute Care and Mental Health Product Lines combined total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast). ……. Page 86

Figure 32: STVHCS ALMD Medicine Service total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast). …… Page 87

Figure 33: STVHCS ALMD Surgery Service total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast). …… Page 88

Figure 34: STVHCS ALMD Mental Health total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast). …… Page 89

Figure 35: STVHCS ALMD Average cost per VEV admission by service and combined totals, actual FY and forecasted FY 2001 – FY 2005 (Forecasted Cost Per Admission = Inverse Log Admission Forecast ∗ Prior FY + 6% Cost of Living and Inflation Increase). …… Page 90

TABLE OF FIGURES
(Continued)

Figure 36: STVHCS ALMD Acute Care and Mental Health Product Lines combined total VEV cost, Actual FY and forecasted FY 2001 – FY 2005 (Total Forecasted Cost = Forecasted Cost Per Admission ∗ Forecasted Admissions). ……. Page 91

Figure 37: STVHCS ALMD Acute Care and Mental Health Product Lines combined total inpatient cost, Actual FY and forecasted FY 2001 – FY 2005 (Total Forecasted Cost = Forecasted Cost Per Admission ∗ Forecasted Admissions). ….. Page 92

INTRODUCTION

In the 1980's, health care organizations began decreasing patient bed days of care (BDOC) due to Medicare's introduction of a prospective payment system. By using diagnosis-related groups (DRG), Medicare reimbursed hospitals with preset payments for services rendered rather than on costs (Getzen, 1997). The purpose of this payment system was to conserve resources by providing financial incentives for hospitals to spend only what they needed to achieve the highest possible patient outcomes (Sultz & Young, 1999).

The Department of Veterans Affairs (DVA) mandated that the Veterans Health Administration (VHA) use the DRG system in 1984 for reporting of patient activity and encouraged the least resource consuming level of care in providing the appropriate medical care. (Rosenheck, & Massari, 1991). In 1985, the VHA began closely monitoring patient days of care affiliated with DRG and the VA introduced a resource allocation methodology (RAM) to fund facilities using DRG and BDOC (Rosenheck, Massari, & Astrachan, 1990). Due to budget restraints and an increase of patients in the early 1990's, the VHA started a push to decrease patient beds in facilities. The decrease in beds was accomplished by decreasing BDOC per episode of care and moving towards outpatient care (Hendricks, Remler, & Prashker, 1999).

By the middle of the 1990s, the VHA was showing progress in decreasing patient beds and BDOC by streamlining systems in their facilities. Professor Eastaugh of George Washington University, explained that a day of care provided at minimum cost creates economic efficiency (Eastaugh, 1998). The efficient and effective use and delivery of health care, has become one of the prime goals of the VA and by FY 1999 VA was providing health care to over 3.6 million veterans each year while decreasing admissions

and BDOC (Feussner, Kizer, & Demakis, 2000). South Texas Veterans Health Care System (STVHCS) followed the national directives to improve access and quality and to decrease or to stabilize cost.

Conditions Which Prompted the Study and Statement of the Problem

South Texas Veterans Health Care System has aggressively pursued outpatient care; as a result, bed days of care (BDOC) decreased by 41.6% over a ten-year period. Although there has been an overall decrease in the number of BDOC and a leveling off of trends in bed utilization, there has been a noticeable increase of admissions in the last two fiscal years (FY) (VA FY begins October 1 and ends September 30). Table 1 depicts STVHCS, BDOC, admissions, bed utilization, and the actual facility beds for FY 1991 through FY 2000..

Table 1

STVHCS Total BDOC, Number of Patients, Percentage of Bed Utilization, and Available Beds by Fiscal Year

Fiscal Year	Patient Bed Days of Care	Number of Admissions	Bed Utilization	Available Beds
1991	178,288	12,827	67.47%	724
1992	189,350	12,899	74.36%	696
1993	189,525	12,748	76.15%	683
1994	187,006	12,940	69.55%	736
1995	176,457	12,381	70.77%	683
1996	157,876	12,263	67.98%	644
1997	131,744	11,224	65.48%	549
1998	116,741	9,218	71.16%	449
1999	104,880	10,095	79.78%	392
2000	104,123	10,126	73.13%	389

Richard Bauer, M.D., Chief of Staff, of the STVHCS questioned whether the recent increases in the number of admissions was due to increase usage by Vietnam Era

Veterans (VEV), which prompted this study. While contemplating this question, he had other questions that needed answers. First, what impact would VEV have on inpatient care for the Acute Care and Mental Health Product Lines at the Audie L. Murphy Division (ALMD) in the coming years? Secondly, what effect would this have on admissions, BDOC, and cost?

In order to answer Dr. Bauer's questions, data on VEV's inpatient utilization on the Acute Care and Mental Health Product Lines at ALMD for the past ten fiscal years were collected. Secondly, cost data on VEV by DRG for FY 2000 were collected and a costing mechanism for prior years was established. Third, a methodology to forecast VEV utilization and cost for the next five fiscal years was developed. Finally, the results from the forecast model were compared against the VA Office of Policy and Planning forecasting study commissioned with the actuarial firm of Milliman & Robertson (M & R).

Application to the Veterans Healthcare System

The development of a model to forecast future VEV needs, utilization, and cost of the Acute Care and Mental Health product lines will assist STVHCS administrative and clinical executives in several ways. First, the information can be used in the development of a strategic plan, which will allow coverage of any specialized services needed for VEV. Secondly, the allocation and distribution of resources for the future can be budgeted and requested from VA Headquarters. Finally, clinical executives will be able to evaluate their future residency program needs and make appropriate changes.

Background

The VA has published demographic studies showing that there were approximately 24.4 million veterans in the United States as of July 1999; and, of this

population, 8.1 million or approximately one third were Vietnam era veterans (VEV) (Anonymous, 2000). The proportion of veterans 65 years of age or older is projected to increase, from 38% to 43% by 2010 and by 2013 the majority of these will be VEV (Anonymous, 2000, March). Ninety percent of the 8.1 million VEV are 45 to 64 years of age, with a median age of 52.2 as per the VA budget submitted to Congress for FY 2001 (Anonymous, 2000). As the VEV age and leave the workforce, they are more likely to seek medical care services either in Department of Defense facilities, if retired military, or in the VHA system. The reasoning behind this statement is, due to the increase cost of medical care insurance or coinsurance policies and a decline in income after retirement, it is more likely VEV will cancel their medical insurance and look to the VHA for their health care needs (Hackler, 1994). The Bureau of Labor Statistics reported in 1999 that approximately 1.9 million or 23.5% of VEV have a service connected disability, but only 933,000 are using the VHA (Bureau of Labor Statistics, 1999).

In the past five years to better serve this population and enhance market share, the VHA created community based outpatient clinics (CBOC). The changing population of veterans and the demographics reported in these reports by just sheer numbers, and the addition of CBOC, points toward an increase in the care of VEV. As a result of this increase in VEV, STVHCS needs to be ready with the resources to assure that these veterans are provided quality of care at the lowest possible cost.

LITERATURE REVIEW

There has not been any published studies regarding the admissions and utilization of BDOC by VEV; however there has been published studies and reports dealing with specific programs, diseases, morbidity, and psychological illnesses in the VEV population. The VHA also contracted with an actuary firm to perform forecasting of

patient utilization in FY 2000. Scrutinizing these reports and studies has enhanced the perspective on the future needs for the VEV, which will be covered in the following pages.

The Decline of Bed Days of Care in the VHA

The VHA's reinvention efforts in the 1990s have radically redesigned the way health care is provided and funded in Veterans Affairs health care facilities. Under the old system, the veteran had to be hospitalized to be eligible for care or to have a simple procedure performed, which routinely was performed on an outpatient basis in the private sector (Kizer, Demakis, & Feussner, 2000). With the reinvention of the system, the VA created a new funding process designed around a capitation-based resource allocation methodology which improved quality of care, provided better access, and optimized resources throughout the system (Kizer, Demakis, & Feussner, 2000). For example, the number of patient BDOC have fallen more than 67% in the past 10 years from over 16,086,645 in fiscal year (FY) 1991 to 5,299,680 in FY 2000, while the number of beds decreased from 66,664 in FY 1991 to 20,404 in FY 2000. The largest decline has been in the last five years. Table 2 demonstrates the decline in facility beds and BDOC for the VHA from FY 1991 to FY 2000 (Anonymous, 2000). Even with the decrease in beds and the enhanced efficiencies in BDOC, the VHA has improved patient quality by developing new quality programs for the overall system like the National Surgical Quality Improvement Program (NSQIP) . Some health systems like STVHCS have looked at other ways to improve quality by establishing product lines, benchmarking against the national numbers from the NSQIP.

Table 2

Veterans Health Administration's Hospital Available Beds and Accumulated Patient Bed Days of Care by Fiscal Year

Fiscal Year	Available Beds	Patient Bed Days of Care
1991	66,664	16,086,645
1992	55,035	15,924,294
1993	54,138	15,465,050
1994	52,192	14,827,760
1995	48,602	13,676,550
1996	44,082	11,606,592
1997	29,788	8,631,155
1998	23,176	7,167,505
1999	21,583	6,327,640
2000	20,404	5,299,680

During the restructuring of the VHA, an impetus was placed on improving the quality of care by developing the Quality Enhancement Research Initiative system which identifies research evidence best practices (Feussner, Kizer, & Demakis, 2000). Best practices not only improves patient outcomes, it also improves efficiency by decreasing BDOC and increasing access to care (Feussner, Kizer, & Demakis, 2000).

STVHCS has been utilizing best practices to improve quality of care since the introduction of the National Surgical Quality Improvement Program in 1992. The VA initiated this ongoing program to decrease postoperative morbidity and mortality, which, in turn, enhances quality by improving patient outcomes and decreasing BDOC (Khuri, et. al., 1995). STVHCS decreased overall beds from 724 in FY 1991 to 389 in FY 2000 and decreased BDOC from 178,288 in FY 1991 to 104,123 in FY 2000, while sustaining a 70% or higher bed utilization rate.

Creation of Product Lines

In 1996, STVHCS started restructuring and integrating services into product lines. The Acute Care and Mental Health are two of the major product lines that were created at STVHCS. Medicine and Surgery are the two main services grouped into the Acute Care product line and Psychiatry, Psychology, and Social Work are the main services in the Mental Health product line. These product lines monitor and control the majority of BDOC used at STVHCS.

There are several reasons that product lines are used at STVHCS; first, there was a need to foster improved communications among services to facilitate the continuity of care. Referrals between the services are a common practice but follow-up and responsibility of continuing of care for the patient sometimes fell through the cracks due to the separation of services. Secondly, like services could be combined making it more efficient for patient care and education. For example, Medicine and Surgery both have endoscopic labs. These labs are being combined in the summer of 2001 to improve patient care and reduce cost. Finally, the combining of services into product lines has enabled management to monitor and control cost, by benchmarking with the standards of care in the community (Janssen, 1991).

Janssen introduced a good definition for a product line in an article in Health Services Management Research;

> A product line is a set of products that are related to each other by such factors as the type of need they satisfy, the way they are used, the customers who use them, the mechanisms through which they are marketed. In effect a product line is a set of products that when planned, managed or marketed as a group yields some advantage over being treated as isolated individuals (Janssen, 1991).

Table 3 depicts STVHCS ALMD, Acute Care and Mental Health Product Line's total BDOC, number of admissions, percentage of bed utilization, and available beds by fiscal year; long-term care numbers were removed. The table illustrates that these two product lines decreased BDOC by 50% from 141,267 BDOC in FY 1991 to 70,393 BDOC in FY 2000. The product lines have become more efficient, by treating more patients with less BDOC and beds. As the BDOC decreased, ALMD was able to close beds and transfer patient care to an outpatient basis. Available beds decreased from 574 in FY 1991 to 269 in FY 2000, which was a decrease of 53%. Although there was a noticeable overall increase in admissions in FY 1999 and FY 2000, BDOC decreased.

Table 3

STVHCS ALMD, Acute Care and Mental Health Product Line BDOC, Number of Patients, Percentage of Bed Utilization, and Available Beds by Fiscal Year

Fiscal Year	Patient Bed Days of Care	Number of Admissions	Bed Utilization	Available Beds
1991	141,267	12,576	67.43%	574
1992	144,723	12,559	78.15%	506
1993	138,309	12,345	74.74%	507
1994	133,869	12,596	72.92%	503
1995	126,892	11,961	69.12%	503
1996	110,230	12,033	70.53%	427
1997	91,499	10,835	67.57%	371
1998	76,256	8,865	71.06%	294
1999	70,815	9,533	72.12%	269
2000	70,397	9,653	71.50%	269

Vietnam Era Veteran

The VA groups veterans by the period of time a veteran served in the military. The VEV consists of all service men and women who served between August 1964 to May 1975 (Keane, Kaloupek, & Kolb, 1998). Due to the special circumstances and

conditions of the Vietnam War, many health programs and studies dealing with medical conditions have been performed by researchers or commissioned by the VHA.

Conditions and Program That Will Effect VEV Utilization

Special programs like the Agent Orange Registry, which was established in 1978 is used by the VA to offer health examinations to veterans who are concerned about the possible long-term medical effects of exposure to Agent Orange (Beckham, et al., 1998). The VA found sufficient evidence with Agent Orange and other herbicides used in Vietnam that are associated with certain diseases such as: soft-tissue sarcoma, non-Hodgkin's lymphoma, Hodgkin's disease, chloracne, porphyria cutanea tarda, and most recently type-II diabetes (VA Links, 2000).

Another study that was commissioned by the VA was on the post effects of malaria. A statement submitted before the Subcommittee on Veterans Affairs in 1998 suggested that as many as 250,000 veterans may have been afflicted with malaria while in Vietnam. Even though they may have recovered from the illness, a number of these veterans have developed cerebral malaria. Cerebral malaria creates multiple neuropsychiatry symptoms like posttraumatic stress disorder (PTSD), which could become problematic many years after the original acute malaria was cured (Varney, 1998). Other programs and studies from the late 1970s to the present date have focused on the psychological aspects of combat on Vietnam veterans.

Mental Health and the VEV

The most common psychological disorders found in the VEV are: PTSD, substance abuse, anxiety, and depression (Beckham, et. al., 1998). Since 1978, the VHA has established 26 specialized inpatient PTSD units throughout the nation. These units provide a comprehensive and intensive therapeutic environment of care for the United

States veteran (Johnson, et. al., 1996). The aim of the PTSD units is to facilitate the assimilation of the Vietnam veteran into society rather than concentrating on his war experience. The PTSD units use a three-phase program to accomplish the goal of integration into society. First, the physician prepares the patient by examining his traumatic experiences through relaxation, sleep, and anger management training which allows the mental health staff to conduct a fairly extensive review of his life and illness. To assist with this phase, creative arts therapies are used to increase a patient's expressiveness and to assist him in becoming comfortable with his emotions. The second phase uses both group and individual therapy to review the individual's traumas and uses cognitive restructuring techniques to alter the patient's attitude toward these traumas. The final phase focuses on the individual's relations with the community, family involvement, and planning for the future (Johnson, et al., 1996). To support PTSD, the VA established the National Center for PTSD in 1989 to perform research studies and educational projects focusing on PTSD and other psychological and medical consequences of traumatic stress. The National Center for PTSD was designed to assist, inform and educate a large audience, such as veterans and other survivors of traumatic experiences, family members, clinicians, researchers, and others interested in understanding PTSD (Schnurr, 1998). It has been suggested that if PTSD is not treated soon after exposure that the disorder might become chronic and resistant to treatment interventions (Bremner, Southwick, Darnell, & Charney, 1996). If this statement is true, then the VA might see an increase in psychiatric care as the Vietnam combat veterans enters into retirement age.

In a Veterans Health Study performed in 1998, over two-thirds of the participants reported receiving some type of mental health treatment. These rates were found to be twice as high as those of patients in the private sector. There are several possible

explanations for this finding. First, in the VHA system there are fewer barriers to referring a patient for mental health treatment than in the private sector. Secondly, veterans who do not normally use the VHA may be more inclined to seek mental health care by the VHA, than from the private sector (Hankin, Spiro, Miller, & Kazis, 1999). Other areas that must be touched upon dealing with the mental health issues are mortality, homelessness, and habitual wandering patients.

Studies have shown that there is an increased risk for suicide and other traumatic deaths, in particular accidental poisoning, in Vietnam veterans with PTSD. The risk within this veteran population is twice as high as the risk reported for peacetime veterans. The study suggests that PTSD has attributed to deaths resulting from external causes, such as accidental drug overdoses, motor vehicles accidents, and suicides (Bullman, & Kang, 1996). The mortality of veterans that were wounded or injured in combat was found to be lower than the numbers expected from the US general population. This is probably due to the constant medical checkups and follow-ups by the VA in which most mental problems are detected and treated early on (Bullman, & Kang, 1996) (Bullman, Kang, & Talbott, 1997).

The VA is the largest direct provider of services to homeless persons. Each year health care services are provided to over 65,000 homeless veterans which is approximately forty percent of the homeless population in the United States. Of the homeless veteran population, it has been found that approximately eighty-two percent have mental health problems and the majority of these percentages are VEV (Rosenheck, & Kizer 1998). There is also a high rate of tuberculosis in the homeless population. The Center for Disease Control and Prevention (CDC) reported in 1997 that tuberculosis cases increased to 6.5 percent of the homeless population, which is much higher than the

general public (Marks, et al., 2000). Included in the homeless group of veterans are the habitually wandering patients.

In 1991 a study found that 2.8 percent of all acute psychiatric care admissions were from habitually wandering patients in the VA system which accounted for $25 million in inpatient care and about $1.5 million in outpatient care. Analysis of the data in the study also suggested that 84 percent of the discharges of these veterans were for substance abuse and mental disorders. The researchers calculated that $6.5 million worth of medical care was consumed by 35 habitually wandering veterans over the five years of the study. Habitual wanderers have more complex problems, which are characterized by impulsiveness, transient styles, substance abuse, and character disorders (Pankratz, & Jackson 1994). Even though these veterans make up a small number of the overall veterans using the VA system, they consume a large portion of health care expenditures.

Comorbidity and the VEV

An important factor that must be discussed dealing with PTSD patients is comorbidity. A study performed in mid 1980 by the CDC, reported that there was no difference in physical health status detected between Vietnam and non-Vietnam veterans (Center for Disease Control, 1988). Research completed recently indicates that Vietnam veterans with PTSD reported more current and chronic health problems. Their health care providers also rated PTSD veterans as having a greater number of health problems (Beckham, et al., 1998). In a 1997 study, it was reported that 27.1 percent of veterans with PTSD had 3 non-psychiatric medical conditions and 31.9 percent had four or more non-psychiatric medical conditions (Zatzick, et al., 1997). Researchers report that there is a greater cardiovascular morbidity associated with higher severity of PTSD (Friedman, & Schnurr, 1995). In addition, other studies performed have reported that there may be a

fairly strong link between severe stress exposures and other broad spectrum of diseases (Boscarino, 1997). The analysis in Boscarino's study explained that several diseases are associated with PTSD. These conditions include circulatory, digestive, musculoskeletal, nervous system, respiratory, and non-STD infectious diseases. Also reported in another study, is an affiliation with increased PTSD and heavy use of tobacco products, alcohol, and drugs which, in turn, creates greater health problems (Bremner, Southwick, Darnell, & Charney, 1996). Recent research also suggests that there is an association between PTSD and short term and long term memory loss (Barrett, Green, Morris, Giles, & Croft, 1996). Vietnam veterans with PTSD also have a high rate of comorbidity with other psychiatric disorders like depression and anxiety disorders (Bremner, et al., 1997). This research and the findings from the previously mentioned studies, point toward an increase utilization of mental health care, medicine, and surgical resources in the future by the VEV.

Decline of the Veterans Population

The estimated total veteran population in the U.S. has declined 9%, from 27.3 million in 1990 to 24.4 million in 2000. By the year 2010, the total veteran population is expected to decline to 20.1 million and by the year 2020 it is projected to decline to 16.2 million (Anonymous, 2000, March). This is a 7 percent a year decline in veteran population each year. The projected decline is due to veteran deaths exceeding the number of new separations from the military each year. For example, in 1995 there were 515,000 veteran deaths compared to 211,000 separations from the military (Anonymous, 2000, March). It has been projected that there will be 618,000 veteran deaths in 2010 compared to 181,000 separations from the military and the numbers of both deaths and separations are projected to decline after 2010. The excess of annual projected deaths

over separations accounts for the projected decline in the veteran population (Anonymous, 2000, March). Even with these projected declines, the VHA is expecting utilization to increase due to the aging veteran population.

Age and the VEV

One of the most pressing problems in health care at the present time is the rapidly increasing age of the U. S. population, which will require a large allocation of health related resources. The elderly are the heaviest users of health services. In 1994, persons 65 and over accounted for 12 percent of the population and used one third of the health expenditures (Jecker, & Pearlman, 1994). By 1995, per capita health care expenditures for 65 and over were $7,038, which was four times that for people under 65. The majority of this care for the elderly was inpatient care (Druss, Rohrbaugh, & Rosenheck, 1999). It has been predicted that by 2020 the elderly will account for over one half of the nations expenditures (Hackler, 1994). Along with the civilian population increase in the elderly, the veterans are also aging.

As mentioned earlier in this study, 9.3 million veterans are over the age of 65. This figure is expected to decrease to 8.5 million by 2010. It is projected that a second peak of close to 9 million veterans age 65 or over will occur about 2013, consisting mostly of VEV. Between 2010 and 2020, all the age groups are projected to decline. The proportion of veterans 65 or over, however, is projected to increase, from 43% in 2010 to 51% in 2020 due mostly to VEV. (Anonymous, 2000, March).

Recognizing the impact of the increasing older veterans in 1975, the VA established Geriatric Research, Education, and Clinical Center (GREEC) programs at a number of health care facilities. The GREEC programs were established to increase knowledge of the aging process, share this knowledge with other health care providers,

and improve the overall quality of care of the older veteran population. There are now 16 GREECs throughout the U. S., which are at the forefront of the fields of gerontology and geriatrics (Anonymous, March 1999).

To accommodate the increased utilization of health services by the aging veteran population, programs must be designed that will preserve the present system's quality of care, prevent excessive waste, control cost, and increase access to the system. With the increase in age comes an increase in disease morbidity. Age related conditions like hip fractures and dementia are expected to increase sharply in the 21st Century. In the general population, hip fracture spending is expected to increase from $1.6 billion in 1987 to over $6 billion by 2040. The cost to care for dementia in 2040 is projected to be greater than the 1990 federal deficit (Schneider, & Guralnik, 1990). Other conditions such as circulatory, digestive, musculoskeletal, nervous system, and respiratory parallel the increase in age. As the total VEV population ages, it is predicted that these veterans will seek care at the VHA. This is due to the expanded services the VHA offers, the increased quality of care in all the VHA facilities, and free health care services (Kizer, Demakis, & Feussner, 2000).

METHODS AND PROCEDURES

Data used in this study were derived from STVHCS Veterans Health Information Systems and Technology Architecture (VISTA) database, specifically the Patient Treatment File (PTF), Census files, and the Decision Support System (DSS) for FY 1991 through FY 2000. Other data were obtained from Medical Administration Service (MAS) at STVHCS, Austin Automation Center, and the VA National Headquarters. Advantages of using preexisting databases include the following: First, databases give an opportunity to examine trends in data and the changes that occur in the sample population. Secondly,

databases also help the researchers by minimizing the task of primary data collection (Beyea, & Nicoll, 1999).

Census Data

Preliminary data derived from the PTF include the number of admissions by Social Security Number (SSN), patient's age, BDOC per episode, and primary DRG per episode. SSNs were eliminated to preserve individual privacy in this study. Data from the Census file, MAS, Austin Automation Center, and VA National Headquarters in Washington D.C. were used to calculate the number of beds occupied at the national, facility, and product line levels. For the purpose of this study, only patient census data from the Acute Care (Medicine and Surgery) and the Mental Health Product lines were used. Only whole FY year data sets from FY 1991-FY 2000 were used in this study. The data revealed a total of 110,480 admissions and 1,104,257 BDOC documented during the ten-year period. Of these numbers, VEV utilized 41,428 admissions or 37.5% of total admissions and 402,444 BDOC or 36.4% of total BDOC.

Table 4 displays STVHCS ALMD correlated census data for FY 1991 – FY 2000 collected on Medicine, Surgery, and Mental Health services. This table represents the total cumulative BDOC used, total possible beds available, actual beds available, total admissions, total cumulative VEV BDOC used, and the total VEV admissions by service. In addition to the census data, the percentage of total bed utilization, percentage of VEV beds compared to total beds used, percentage of VEV admissions compared to total admissions, average BDOC per VEV admission, and the average age of VEV per year were calculated and shown in table 5.

Table 4

STVHCS ALMD Census Data Collected on Medicine, Surgery, and Mental Health Services

STVHCS CENSUS FY	CUM BDOC	TOTAL POSSIBLE BDOC	ACTUAL BEDS	TOTAL ADM	CUM VEV BDOC	TOTAL VEV ADM
MEDICINE						
1991	55,186	78,840	216	6,206	8,745	1,014
1992	55,506	73,785	202	6,075	10,003	1,100
1993	55,265	73,730	202	6,028	11,318	1,386
1994	54,099	90,315	247	5,981	11,664	1,470
1995	53,312	82,181	225	5,643	12,609	1,554
1996	45,998	71,546	195	5,573	14,203	2,019
1997	39,192	63,696	175	5,232	15,098	2,082
1998	30,798	49,424	135	4,371	11,893	1,757
1999	29,601	45,986	126	4,790	10,200	2,015
2000	31,127	46,118	126	4,866	13,420	2,329
MENTAL HEALTH						
1991	39,678	54,750	150	2,050	21,374	1,236
1992	43,656	48,678	133	2,241	23,562	1,316
1993	42,743	49,244	135	2,326	25,339	1,495
1994	41,518	48,545	133	2,448	23,524	1,561
1995	40,405	48,545	133	2,489	23,570	1,518
1996	37,241	47,638	130	2,575	24,620	1,647
1997	32,734	44,153	121	2,846	22,260	1,673
1998	30,740	39,785	109	2,751	21,740	1,736
1999	26,147	31,860	87	2,847	15,523	1,566
2000	24,738	30,744	84	2,726	14,756	1,635
SURGERY						
1991	46,403	75,920	208	4,202	8,243	983
1992	45,561	72,272	197	4,073	7,604	956
1993	40,301	62,780	172	3,725	7,687	1,016
1994	38,252	64,337	176	3,866	9,313	1,152
1995	33,175	52,925	145	3,607	7,964	1,046
1996	26,991	47,172	129	3,502	6,812	1,136
1997	19,573	37,608	103	2,464	4,628	791
1998	14,718	24,184	66	1,471	4,466	545
1999	15,067	21,535	59	1,709	4,962	809
2000	14,532	21,594	59	1,797	5,344	885

AVG = AVERAGE BDOC = BED DAYS OF CARE
CUM = CUMULATIVE ADM = ADMISSIONS

Table 5

STVHCS ALMD Census Data Percentage Calculations for Medicine, Surgery, and Mental Health Services

	FY	PERCENTAGE BED UTILIZATION	VEV BDOC % OF TOTAL CUM BDOC	VEV % OF TOTAL ADM	AVG BDOC PER VEV ADM	AVG AGE VEV PATIENT
MEDICINE	1991	70.00%	15.85%	16.34%	8.6	55.4
	1992	75.23%	18.02%	18.11%	9.1	55.2
	1993	74.96%	20.48%	22.99%	8.2	55.1
	1994	59.90%	21.56%	24.58%	7.9	55.3
	1995	64.87%	23.65%	27.54%	8.1	55.6
	1996	64.29%	30.88%	36.23%	7.0	55.8
	1997	61.53%	38.52%	39.79%	7.3	55.8
	1998	62.31%	38.62%	40.20%	6.8	56.3
	1999	64.37%	34.46%	42.07%	5.1	56.6
	2000	67.49%	43.11%	47.86%	5.8	56.3
MENTAL HEALTH	1991	72.47%	53.87%	60.29%	17.3	50.8
	1992	89.68%	53.97%	58.72%	17.9	50.7
	1993	86.80%	59.28%	64.27%	16.9	50.7
	1994	85.52%	56.66%	63.77%	15.1	50.9
	1995	83.23%	58.33%	60.99%	15.5	51.3
	1996	78.17%	66.11%	63.96%	14.9	51.4
	1997	74.14%	68.00%	58.78%	13.3	51.5
	1998	77.27%	70.72%	63.10%	12.5	51.1
	1999	82.07%	59.37%	55.01%	9.9	51.5
	2000	80.46%	59.65%	59.98%	9.0	51.1
SURGERY	1991	61.12%	17.76%	23.39%	8.4	56.5
	1992	63.04%	16.69%	23.47%	8.0	56.3
	1993	64.19%	19.07%	27.28%	7.6	56.4
	1994	59.46%	24.35%	29.80%	8.1	55.6
	1995	62.68%	24.01%	29.00%	7.6	56.4
	1996	57.22%	25.24%	32.44%	6.0	56.3
	1997	52.04%	23.64%	32.10%	5.9	55.7
	1998	60.86%	30.34%	37.05%	8.2	56.2
	1999	70.63%	32.93%	47.34%	6.1	56.5
	2000	67.30%	36.77%	49.25%	6.0	56.6

CUM = CUMULATIVE
ADM = ADMISSIONS
AVG = AVERAGE
BDOC = BED DAYS OF CARE
VEV = VIETNAM ERA VETERANS

Tables 6 and 7 represent the Acute Care Product Line (Medicine and Surgery), and the Mental Health Product Line combined census data collected and percentage calculations.

Table 6

STVHCS ALMD Census Data Collected on Acute Care and Mental Health Product Lines Combined

	FY	CUM BDOC	TOTAL POSSIBLE BDOC	ACTUAL BEDS	TOTAL ADM	CUM VEV BDOC	TOTAL VEV ADM
AC & MH	1991	141,267	209,510	574	12,458	38,362	3,233
	1992	144,723	194,735	532	12,389	41,169	3,372
	1993	138,309	185,754	509	12,079	44,344	3,897
	1994	133,869	203,197	557	12,295	44,501	4,183
	1995	126,892	183,651	503	11,739	44,143	4,118
	1996	110,230	166,356	455	11,650	45,635	4,802
	1997	91,499	145,457	399	10,542	41,986	4,546
	1998	76,256	113,393	311	8,593	38,099	4,038
	1999	70,815	99,381	272	9,346	30,685	4,390
	2000	70,397	98,456	269	9,389	33,520	4,849

Table 7

STVHCS ALMD Census Data Percentage Calculations for Acute Care and Mental Health Product Lines Combined

	FY	PERCENTAGE BED UTILIZATION	VEV BDOC % OF TOTAL CUM BDOC	VEV % OF TOTAL ADM	AVG BDOC PER VEV ADM	AVG AGE VEV PATIENT
AC & MH	1991	67.43%	27.16%	25.95%	11.9	54.2
	1992	74.32%	28.45%	27.22%	12.2	53.8
	1993	74.46%	32.06%	32.26%	11.4	53.7
	1994	65.88%	33.24%	34.02%	10.6	54.0
	1995	69.09%	34.79%	35.08%	10.7	54.2
	1996	66.26%	41.40%	41.22%	9.5	54.4
	1997	62.90%	45.89%	43.12%	9.2	54.2
	1998	67.25%	49.96%	46.99%	9.4	54.0
	1999	71.26%	43.33%	46.97%	7.0	54.7
	2000	71.50%	47.62%	51.65%	6.9	54.6

AC & MH = ACUTE CARE & MENTAL HEALTH PRODUCT LINES
CUM = CUMULATIVE VEV = VIETNAM ERA VETERANS
ADM = ADMISSIONS BDOC = BED DAYS OF CARE
AVG = AVERAGE VEV = VIETNAM ERA VETERANS

Utilization trend analyses are made between data from FY 1991 through 2000. Changes in years are used to perform a retrospective study to assist in developing a forecasting methodology. For each unique patient discharge, data were obtained on the primary DRG and total BDOC was computed. To test for verification and internal reliability of the data, different sources from different databases were used. For instance, the BDOC data extracted from the census file were verified by the data retrieved from MAS, and the total number of patients extracted could be verified by the DSS database for FY 1998-2000. Some of the earlier data in the VISTA database, however, were incomplete. A small amount of the patients either had the number of BDOC and or the DRG missing or the DRG was not valid. These patients were eliminated from the data set in order to preserve the integrity and usefulness of this study for decision-making, which depends on the reliability, and validity of the data.

Reliability and Validity

In FY 1999 and FY 2000, the Office of the Inspector General (IG) completed objective performance audits to assure that the VHA was maintaining an acceptable level of data quality (Anonymous, 2000). In order to ensure a greater understanding among VA staff and managers, the IG auditors provided the following definitions:

- Reliability - are the data consistent and can they be replicated; and
- Validity - does the data represent what they are supposed to or intended to; and
- Integrity - can the data be gamed or manipulated.

Reliability is the extent to which a measurement is consistent and free from error. (Portney, & Watkins, 2000). A study must be reproducible or dependable to be reliable. The data collection and analytic methods must be documented in a way to insure that

other VA facilities can reproduce the study using their patient database. The more the data collected are free from error, the more likely the results will be of value to the study. Once the data are proven to be reliable, they must be evaluated and analyzed to use for predictions of future outcomes.

Validity ensures that a test is measuring what it is intended to measure and places significance on findings of a test and the ability to make deductions from these findings (Portney, & Watkins, 2000). A precondition of validity is reliability; it is of little value putting energy into determining the reliability of data if the study does not test what you want it to test (Gibbon, 1998).

Costs Methodology

The FY 2000 facility cost data were extracted from the DSS database. This was the first year STVHCS's administration felt fairly confident that the DSS information was accurate and could be used as a baseline. The total cost for each FY was computed by using cost per unique DRG from FY 2000. Each unique DRG cost was matched with each unique VEV DRG for each FY and then totaled. This produced a total cost per year at current dollars for each FY by the DRG (see Tables 8 and 9).

The total DRG past cost per year was calculated using the present value function in Excel. The total past cost was designed by matching the corresponding year of the total DRG present value cost per year (cost in current dollars) and regressing back using a combined inflation and cost of living increase of 6% annually. Using Medicine service's FY 1991 total cost per unique DRG of $8,644,066 as an example, the total cost in current dollars per year using present value function is $5,116,409. The FY 1991 total cost per year using present value function is computed by using a rate of 6%, with 9 years as the

total number of payment periods annually. This should give a fairly accurate actual cost per FY.

Table 8 displays STVHCS ALMD cost for VEV by service, and table 9 represents the Acute Care and Mental Health Product Lines combined costs. Also disclosed in the tables are the Average Cost Per VEV Admissions and the Average Cost Per BDOC. The Average Cost Per VEV Admissions Current Value was calculated, by dividing the Total Cost Per Year Current Value by the Total VEV Admissions from tables 4 and 6 for each corresponding year. The Average Cost Per BDOC was produced, by dividing Total Cost Per Year Current Value by the Cumulative VEV BDOC from the same tables. Cost trend analysis was performed on each service, product lines, and product lines combined to give STVHCS administration an insight on where resources are being utilized.

The most common DRG field is inserted in the table to assist the clinical services in establishing a degree of severity change through the years.

Table 8

STVHCS ALMD Costs Data for Medicine, Surgery, and Mental Health Services

COST FOR VEV USING FY 2000 COST PER DRG FOR EACH YEAR						
	FY	MOST COMMON DRG PER SERVICE	TOTAL COST PER YEAR BY DRG CURRENT VALUE	TOTAL COST PER YEAR BY DRG PAST COST	AVG COST PER VEV ADM CURRENT VALUE	AVG COST PER BDOC
MEDICINE						
	1991	467	$8,644,066	$5,116,409	$8,525	$988
	1992	124	$10,235,717	$6,422,015	$9,305	$1,023
	1993	124	$12,016,590	$7,991,718	$8,670	$1,062
	1994	125	$12,604,394	$8,885,600	$8,574	$1,081
	1995	202	$13,179,674	$9,848,619	$8,481	$1,045
	1996	125	$15,015,253	$11,893,486	$7,437	$1,057
	1997	125	$16,402,312	$13,771,697	$7,878	$1,086
	1998	202	$14,289,591	$12,717,685	$8,133	$1,202
	1999	143	$15,545,022	$14,665,115	$7,715	$1,524
	2000	143	$18,400,262	$18,400,262	$7,900	$1,371
MENTAL HEALTH						
	1991	430	$6,524,298	$3,861,722	$5,279	$305
	1992	430	$7,802,064	$4,895,111	$5,929	$331
	1993	430	$7,593,695	$5,050,241	$5,079	$300
	1994	430	$7,681,564	$5,415,200	$4,921	$327
	1995	430	$7,234,258	$5,405,858	$4,766	$307
	1996	430	$8,157,922	$6,461,838	$4,953	$331
	1997	430	$8,371,233	$7,028,649	$5,004	$376
	1998	430	$8,044,945	$7,159,972	$4,634	$370
	1999	430	$7,089,838	$6,688,526	$4,527	$457
	2000	430	$7,423,038	$7,423,038	$4,540	$503
SURGERY						
	1991	189	$11,057,701	$6,545,036	$11,249	$1,341
	1992	107	$10,711,580	$6,720,578	$11,205	$1,409
	1993	243	$12,058,296	$8,019,455	$11,868	$1,569
	1994	189	$13,369,839	$9,425,209	$11,606	$1,436
	1995	189	$13,117,576	$9,802,216	$12,541	$1,647
	1996	39	$13,133,611	$10,403,050	$11,561	$1,928
	1997	105	$10,423,301	$8,751,605	$13,177	$2,252
	1998	107	$8,682,087	$7,727,027	$15,930	$1,944
	1999	189	$11,165,804	$10,533,777	$13,802	$2,250
	2000	107	$12,537,313	$12,537,313	$14,166	$2,346

AVG = AVERAGE BDOC = BED DAYS OF CARE
ADM = ADMISSIONS VEV = VIETNAM ERA VETERANS

Table 9

STVHCS ALMD Costs Data for the Acute Care and Mental Health Product Lines Combined

COST FOR VEV USING FY 2000 COST PER DRG FOR EACH YEAR				
FY	TOTAL COST PER YEAR BY DRG CURRENT VALUE	TOTAL COST PER YEAR BY DRG PAST COST	AVG COST PER VEV ADM CURRENT VALUE	AVG COST PER BDOC
AC & MH				
1991	$26,226,065	$15,523,168	$8,112	$684
1992	$28,749,360	$18,037,704	$8,526	$698
1993	$31,668,580	$21,061,414	$8,126	$714
1994	$33,655,797	$23,726,009	$8,046	$756
1995	$33,531,508	$25,056,693	$8,143	$760
1996	$36,306,786	$28,758,375	$7,561	$796
1997	$35,196,846	$29,551,951	$7,742	$838
1998	$31,016,623	$27,604,684	$7,681	$814
1999	$33,800,664	$31,887,419	$7,699	$1,102
2000	$38,360,613	$38,360,613	$7,911	$1,144

AC & MH = ACUTE CARE & MENTAL HEALTH PRODUCT LINES
ADM = ADMISSIONS
AVG = AVERAGE
BDOC = BED DAYS OF CARE
VEV = VIETNAM ERA VETERANS

Descriptive Analysis Methodology

In order to answer Dr. Bauer's question about admissions, a descriptive statistics analysis was used for examination of STVHCS ALMD Acute Care and Mental Health Product Lines combined census data. This was performed, by comparing non-VEV and VEV admissions by each other, which in turn creates ratios. The process is used to observe, describe, explain, predict, test, and evaluate hypotheses associated with the relationship between non-VEV and VEV admissions ratio for the Acute Care and Mental Health product lines combined. This retrospective observation of VEV admissions assisted the researcher in establishing a baseline for VEV trends to produce a forecasting mechanism. The data were analyzed and manipulated using Microsoft Excel 2000 and the

Statistical Package for Social Sciences (SPSS), version 10.0 student package. The data set equals n=10 for each FY. The admissions ratio is the dependent variable (Y) and is continuous. The independent variable (X) is a time-series of numbers from 1 to 10, which represents FY 1991 through FY 2000 and is also continuous. The admissions VEV ratio is a function of FY. If this relationship is true, then the admissions VEV ratio will increase as the FY increase. Therefore, the formal alternate and the null hypothesis are as follows:

H_a: The VEV ratio will increase with each new FY.

H_o: The VEV ratio will not increase with each new FY.

The critical probability level or alpha probabilities was set at the $p = .05$ level for the data set analyses. Data files were constructed for the data sets; means and standard deviations were also computed (see Tables 10 and 11). Figure 1 contains one-way frequency distributions for all variables. Table 12 contains the computations for correlation. A regression equation was also computed for the data set (see Table 13). The trend distribution shown in Figure 2 indicates a positive trend for the VEV ratio per FY. A descriptive statistics summary was computed showing frequency distributions, means, standard deviations, and correlation of the data sets. Student's t test was used to determine the statistical significance of the correlation results.

Table 10

SPSS Computer Data File for Fiscal Year Number to Acute Care and Mental Health Product Lines Combined Admissions Ratios

FY	FY NUMBER	VEV TO NON-VEV RATIO
1991	1	.35
1992	2	.36
1993	3	.41
1994	4	.43
1995	5	.44
1996	6	.48
1997	7	.76
1998	8	.89
1999	9	.89
2000	10	1.07

Table 11

SPSS Descriptive Statistics Regression Results and Inferential Hypothesis Tests of Acute Care and Mental Health Product Lines Combined VEV Admissions Ratios and Fiscal Year Number

Descriptive Statistics

		Statistic	Std. Error
Fiscal Year	N	10	
	Range	9	
	Minimum	1	
	Maximum	10	
	Sum	55	
	Mean	5.50	.9574
	Std. Deviation	3.03	
	Variance	9.167	
VEV Admissions Ratio for Acute Care and Mental Health Product Lines Combined	N	10	
	Range	.72	
	Minimum	.35	
	Maximum	1.07	
	Sum	6.08	
	Mean	.6080	.0843
	Std. Deviation	.2665	
	Variance	.0710	
Valid N (listwise)	N	10	

Table 12

SPSS Correlation Matrices

	Mean	Std. Deviation	N
Fiscal Year Number	5.50	3.03	10
Acute Care and Mental Health Product Lines Combined VEV Admissions	.6080	.2665	10

		Fiscal Year Number	Acute Care & Mental Health Product Lines Combined Admissions
Fiscal Year Number	Pearson Correlation	1.000	.938**
	Sig. (2-tailed)	.	.000
	Sum of Squares and Cross-products	82.500	6.810
	Covariance	9.167	.757
	N	10	10
Acute Care & Mental Health Product Lines Combined Admissions	Pearson Correlation	.938**	1.000
	Sig. (2-tailed)	.000	.
	Sum of Squares and Cross-products	6.810	.639
	Covariance	.757	.0710
	N	10	10

**. Correlation is significant at the 0.01 level (2-tailed).

Table 13

SPSS Regression Analysis

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	X = Fiscal Year Number[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: Y = Acute Care & Mental Health Product Lines Combined Admissions Ratios

Model Summary

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.938[a]	.879	.864	.0981	.879	58.384	1	8	.000

a. Predictors: (Constant), X = Fiscal Year Number

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.562	1	.562	58.384	.000[a]
	Residual	.0770	8	.0096		
	Total	.639	9			

a. Predictors: (Constant), X = Fiscal Year Number

b. Dependent Variable: Y = Acute Care & Mental Health Product Lines Combined Admissions Ratios

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.154	.067		2.297	.051
	Fiscal Year Number	.0825	.011	.938	7.641	.000

a. Dependent Variable: Y = Acute Care & Mental Health Product Lines Combined Admissions Ratios

Trend Analysis Method

Trend analyses were performed on Tables 4 and 5 to break down the utilization by services from Table 6, the Acute Care and Mental Health Product Lines combined. The graphs from the analysis will provide an overall view of utilization by services and product lines. The trend analysis reveals considerable variation in admissions and BDOC by services and product lines.

Forecasting Method

Finally, the data from the utilization trend analysis was used to design a forecasting instrument, by using a best-fit curve. This instrument was used to forecast the future number of admissions to the Acute Care and Mental Health product lines over the next five years. The forecast results were used for two purposes. First, the results were compared to the FY 2000 forecasting study commissioned by the VA Office of Policy and Planning with the actuarial firm of Milliman & Robertson (Veterans Health Affairs. 1999, December). Secondly, the forecasted admission numbers were used to forecast future cost using total cost by admissions and cost per unique VEV admissions. The future costing forecast was formulated using net present value with a 6% cost of living and inflation increase.

Exponential smoothing and regression which includes curve fitting are two principle forecasting model types utilized in the vast majority of forecasting applications (Lewis, 1982). Exponential smoothing is a method that systematically places a high weight on the most recent data and less weight on the older data. This type of forecasting model is good for short-term time-series. For example, when developing a zero-base budget, activity is usually forecasted by month to develop the cost by month (Bonini, Hausman, & Bierman, 1997). The linear regression model fits a straight line to the

sample data like the Graphic comparison of least-square regression, which was performed in the statistics section. The line is placed in such a way as to obtain a reasonable spread of observations on either side and then it is extended to produce forecasts. This method is not necessarily a good fit for the data and this is why modern computerized forecasting programs utilize some form of curve fitting equation (Lewis, 1982)..

Computerized forecasting programs transpose curve equations into the general form of a straight line, use the least squares fitting procedure to calculate the relevant parameters *a* and *b*, and then use the equation of the curve to produce forecasts (Lewis, 1982). The two most common used transformations used in curve fitting are natural logarithms ($\log_e$) and reciprocals ($1/t$) which can be used on either the dependent or independent variable or both (Lewis, 1982). While researching for the best method to forecast the VEV admissions and BDOC, a number of variations of curves were fitted to the data. The curves that were studied for best fit were the following: (a) exponential (simple), (b) power, (c) hyperbolic, (d) logarithmic, (e) *S*, and the (f) inverse log.

As described earlier, the exponential curve makes use of a smoothing constant, which is the percentage of the forecasting affected by the most recent data point. It gives more weight to the more recent data points and less to the earlier data and is good for short term forecasting (Lewis, 1982).

Power curves are used in economics to show a condition required of a demand curve possessing elasticity throughout its length. The percentage increase in time will cause an equal percentage decrease in the dependent variable (Lewis, 1982). This curve is also good for short term forecasting.

Hyperbolic curves are used when a growth situation is reaching saturation, i.e. when utilization is at its max and to increase production one would have to increase

either resources or physical plant. The problem with this curve is that as the independent variable time equals *a*/*b* the curve becomes unstable and does not reflect real life situations to forecast from (Lewis, 1982).

The logarithmic and *S* curves can be used to represent a life cycle of a service or product. The curves demonstrate patterns of a slow start, followed by a steep growth and finally a saturation phase (Lewis, 1982). Neither of the curves followed the actual admission data they leveled off and started a downward trend below the actual last four FY data points.

Finally, the inverse log curves transforms the dependent variable using a reciprocal, while transforming the independent variable with a logarithmic equation. These transforms created a curve by giving more value to more resent data, which fluctuates with the data points as it increased and decreased over a period of time.

All of the curves mentioned above except for the inverse log curve were rejected due to their limited functions. The inverse log curve produced the best fitting curve for the data and was used to produce the forecasting instrument. The inverse log curve equation is $\hat{y}_t = 1/(a + b\log_e t)$, by taking the reciprocal transformation of the dependent variable $\hat{y}_t$ (i.e. $\hat{Y}_t = 1/\ \hat{y}_t$) and a logarithmic transformation of the dependent variable t (i.e. $T = \log_e t$) the equation becomes $\hat{Y}_t = a + bT$ (Lewis, 1982). Figure 3 displays the calculations required to determine the regression line of the inverse log curve for the Medicine service VEV admissions data. Looking at figure 3, $t = 11$ represents FY 2001, when calculated with the inverse log equation equals 2373 admissions. Continuing the formula and replacing t = with 12 through 15 produces the next four data points needed to forecast FY 2002 – FY 2005 (see Table 14). One good feature about the inverse log curve

equation is, that once new FY admissions are available they can be added and recalculated very easily, which assists in improving forecasting.

Table 14

Represents Medicine Service VEV Admissions (*t* = 11 Through 15 for FY 2001 Through FY 2005 Using a Inverse Log Curve Equation)

t =	11	12	13	14	15
FY	2001	2002	2003	2004	2005
ADMISSIONS	2373	2501	2631	2765	2902

The inverse log curve equation was performed on both VEV and non-VEV for each service, which in turn is added together for a service's total forecasted admissions. The services forecasted admission totals are rolled up into the Acute Care and Mental Health product line combined total forecasted admissions.

FINDINGS AND DISCUSSSION

Descriptive Statistics

The exact probabilities are computed in Appendices A and B. For the Admissions n=10 data set, t= 7.64, critical values for a two-tailed t test with an 8 df are 2.306 (alpha at .05 level), and 3.355 (alpha at .01 level). The null hypothesis was rejected and the alternate hypothesis was accepted (critical values from Edwards, 1984, Table iii, pg. 193). Results are displayed in Table 15.

Table 15

SPSS Descriptive Statistics for Fiscal Year Number to Acute Care and Mental Health Product Lines Combined Admissions Ratios.

Sample Size	Variables	Average	Std. Dev.	Correlation
10 Fiscal Years	Fiscal year number FY 1991 = 1 FY 2000 = 10	5.50	3.03	
	Acute Care and Mental Health Product Lines Combined Admissions Ratios	.608	.2665	.938

Ten FYs (1991-2000) were chosen to produce the respective studies needed to lead to valid results. Total veteran admissions and VEV admissions by FY were extracted from the Acute Care and Mental Health Product Lines data that were originally collected. In order to create a separate grand total of all veterans' admissions and VEV admissions by FY, the Acute Care and Mental Health Product Lines total veterans admissions were combined as was the VEV admission by FY. The VEV admissions by FY were subtracted from each corresponding total admission to produce the non-VEV admissions. The VEV admissions were divided by the non-VEV admissions to produce a ratio for each FY. The Pearson correlation coefficient result is arrayed in Table 15. The combined admissions ratio data from the Acute Care and Mental Health Product Lines produced a correlation of .938, which is a positive indicator that the VEV admissions ratio increases as the FY increases. Correlation was interpreted by the shared variance technique. Figure 4 displays a Venn diagram for the variance accounted for correlation. As shown by the

Acute Care and Mental Health product lines combined admissions ratios on the Venn diagram, the variance around the FY numbers is very large 87.95%.

Graphic Comparison of Prediction Equations

Regression results are displayed in Table 16. The Acute Care and Mental Health product lines combined admissions ratio has a positive slope of the regression line. Graph of the data set with the regression line is displayed in Figure 2.

Table 16

SPSS Regression Results and Inferential Hypothesis Tests of Acute Care and Mental Health Product Lines Combined VEV Admissions Ratios and Fiscal Year Number

Sample Size	Regression Equation* Y' = a + b X	Pearson's r	student's t	df	exact p
10 Fiscal Years					
Acute Care and Mental Health Product Lines Combined Admissions Ratios	Y' = .154 + .0825X	.938	7.641	8	.000

* Where a is the Y intercept or regression equation constant, and b is the slope of the regression line.

Inferential Statistics

Results for the hypothesis test is presented in Table 16. As shown, the n=10 Acute Care and Mental Health product lines combined VEV admissions ratios data set revealed a statistically significant results for a fiscal year number effect, with t (8) = 7.641, p<.01. The null hypothesis is rejected and the alternate hypothesis is accepted due to the

evidence that for each FY, the VEV admissions ratio increases. In the last four FYs the VEV ratios increased faster than the first six FYs, which infers that more VEV are being admitted compared to non-VEV. The observed increase in total admissions in FY 1999 for the Acute Care and Mental Health product lines combined was not created by VEV admissions; however, FY 2000 increased total admissions were due to VEV admissions.

Utilization Trend Analysis

Trend analysis of the data has shown over the ten FY periods from 1991-2000, that as beds have been closed, the bed utilization has remained level, and the percentage of VEV BDOC has steadily increased over non-VEV (see Figures 5-6). Figure 7 is the total bed utilization that is featured in figure 5, separated into the different services that represents the Acute Care and Mental Health product lines. The graph reveals that Medicine and Surgery services have averaged in the high 60 percent bed utilization range and Mental Health Services has hovered around the 80 percent range.

The average age of the VEV by service and the product lines combined is represented in Figure 8. The graph reveals that the average age for VEV has remained constant for the mental health services at 51 years old, surgery services has increased by one year from 55 ½ to 56 ½, and medicine services has remained constant at 56 ½ years old. When product lines are combined, the average age trend line reveals a slight increase from 54.2 to 54.6. Since the average age has remained fairly constant over the years, the number of VEV patients that are seen on a recurring basis should be quite low for inpatient care which means that most of the VEV admissions each year are new patients. Another reason VEV average age has not significantly increased over the ten-year period could be that STVHCS is enrolling younger new VEV.

Even though total admissions have decreased over the years, VEV admissions have increased and VEV admissions surpassed non-VEV admissions in FY 2000 (see Figure 9). By separating the admissions by services, Medicine and Mental Health has increased the VEV admissions; however, Surgery service has stayed steady through FY 1996, declined through 1998, and then started to increase in the last two FY (see Figures 10-12). Even though Surgery service has demonstrated an over all decrease in VEV admissions, the ratio of VEV to non-VEV has constantly increased over the years. Figure 13 represents VEV admissions compared to the non-VEV admissions, which produced ratios to graphically illustrate the differences between services and product lines. Medicine service has also increased the VEV admissions ratio. As observed, Mental Health has produced a constant growth in VEV admissions and has always been higher than non-VEV admissions and VEV ratios have fluctuated between 1.2 and 1.8, which means that between one half and two thirds of Mental Health's resources are being used by VEV. As a result of the direct relationship to the decline of total beds and admissions over the years, BDOC have also declined.

The Acute Care and Mental Health product lines combined total BDOC have decreased from FY 1992 to FY 2000 by 51.4%. The majority of the decrease was in non-VEV BDOC as illustrated in figure 14. This confirms that the percentages of VEV BDOC have increased and the average BDOCs per VEV admissions has decreased (see Table 7). When the product lines are separated, dissimilarities, and variations can be distinguished in BDOC. All of the services decreased their total BDOC over the ten FY periods, but only Mental Health declined in both VEV and non-VEV BDOC (see Figures 15-17). This means that the percentages of VEV BDOC to the total BDOC for Mental Health has remained constant at around 60%. Even though the percentage has remained

constant, Mental Health's average BDOC per VEV admission has dropped by 48% (see Table 5). Medicine service experienced a steady decrease in non-VEV BDOC while the VEV BDOC gradually increased. The VEV percentage of BDOC use increased from 15.9% in FY 1991 to 43.1% in 2000. This service decreased the average BDOC per VEV admission by 36% and is averaging 5.9 days an admission. Surgery service decreased in both VEV and non-VEV BDOC but only until FY 1998, where VEV BDOC started to gradually increase. Even though the VEV BDOC decreased over the years, Surgery increased the percentage of VEV BDOC compared to the total BDOC from 17.8% in FY 1991 to 36.8% in FY 2000 and decreased the length of stay to an average of 6 days per admission. The baseline data that has been described in the trend analysis gives the researcher a starting point in developing a good reliable forecasting instrument.

Cost Trend Analysis

As described earlier, the cost data was developed from STVHCS' DSS average cost per unique DRG for FY 2000. There has been an overall increase in cost, despite decreases in admissions and BDOC. The FY 2000 total cost for the Acute Care and Mental Health product lines combined was $ 38,360,613, with a total of 4849 VEV admissions which equates to $ 7,911 per admissions. Figure 18 displays the VEV total costs per year and total VEV admissions. The total cost parallels the total admissions as they increase; but, when breaking down the total cost per admission, the cost per admission decreases over the years (see Figure 19). This can be attributed to some of the services becoming more efficient with inpatient care. Medicine Service decreased VEV cost per admission by 7.3% over the ten year period and Mental Health decreased the cost by 14% (see Figures 20 & 21). Surgery Service has increased in cost per VEV admissions by 26% (see Figure 22). One possible reason the cost for VEV in surgery admissions has

increased is due to the least costly and less extensive procedures are being performed on VEV on an outpatient basis.

Admissions Forecasting

As discussed earlier, the inverse log curve equation was used to develop the admissions forecast trend lines. The top trend line in Figure 23 represents STVHCS ALMD actual Acute Care and Mental Health product lines combined admissions and includes an extension of the FY 2001 through FY 2005 forecasted data points. This graph also displays the VEV and the non-VEV admissions trend lines. The inverse log curve demonstrates that there is an increase in total admissions from FY 2001 through FY 2005. The VEV admissions slightly increases in FY 2001 but steadily increases through the next four FYs, while the non-VEV admissions trend line increases in FY 2001, but decreases in the next four years. The increase in total admissions is represented by the large increase pictured in the actual VEV trend line from FY 1991 through FY 2000.

Once the first inverse log forecast table was created, it was very easy to replace the total admissions numbers with each individual service and generate forecasting graphs. The graphs for each service displays trend lines that represent total admissions, VEV admissions, and non-VEV admissions (Figures 24 –26).

Medicine service forecast admissions illustrated in Figure 24 shows a decline in non-VEV and a steep increase in VEV admissions in FY 2002 through FY 2005. Early in FY 2003 VEV admissions will surpass non-VEV admissions. The forecast for Surgery service reveals that VEV admissions decreased in FY 2001 and will remain constant or level through FY 2005 (see Figure 25). The non-VEV increased in FY 2001, then starts to decrease in FY 2002, and continues this decline through FY 2005. Overall Surgery should decrease admissions over the next five FY. The Mental Health graph in Figure 26

shows that both VEV and non-VEV admissions will continue to increase over the next five FY. At some point in time, Mental Health will pass its BDOC saturation point. If admissions continue increasing at the forecasted rate, the saturation point will be passed in FY 2018. Mental Health currently has 84 beds. By multiplying the number of available beds times 365 days in the year results in a maximum possible BDOC of 30660. Using "9" as the average BDOC per admission for FY 2000 and dividing this into the maximum BDOC produces 3407 admissions, which is the admission saturation point.

BDOC Forecasting

Using the inverse log equation and each services BDOC from Table 4 and the combined services BDOC from Table 6, a forecasting analysis was accomplished on BDOC (see Figures 27–30). The top trend line in Figure 27 represents STVHCS ALMD actual Acute Care and Mental Health product lines combined BDOC, which includes an extension of the FY 2001 through FY 2005 forecasted data points. This graph also displays the VEV and the non-VEV BDOC actual and forecasted trend lines. The total BDOC is forecasted to increase in FY 2001 and start decreasing slightly over the next four FY. This is probable true since more procedures are being performed on an outpatient basis and the VHA is encouraging Mental Health to move substance abuse to outpatient. Observing the VEV and non-VEV forecast BDOC trend lines, illustrates that VEV BDOC will increase as non-VEV will decrease through FY 2005.

The next three figures are graphs of the individual services, which were utilized in the analysis. Medicine service's trend line shows that there will be an overall decrease in BDOC, but the VEV BDOC will increase (see Figure 28). Surgery service also reveals an overall decrease in total BDOC, which is mainly contributed by non-VEV patients (see Figure 29). VEV BDOC will stay fairly constant for Surgery from FY 2001 through FY

2005. Mental Health illustrated in Figure 30, discloses that both VEV and non-VEV BDOC will decrease over the next five years.

Inverse Log Forecast Compared to VA Forecast Study

In FY 2000, the VA Office of Policy and Planning commissioned a utilization forecasting study with the actuarial firm of Milliman & Robertson (M & R). This study was used as a comparison against the results from the inverse log curve study. Figures 31 through 33 are combined data using FY 2000 actual admission data as a baseline point with extensions of FY 2001 through FY 2005 forecasted data from the inverse log curve study, and the actuarial firm forecast study.

When studying Figure 31, which represents the Acute Care and Mental Health Product Line admissions combined, the inverse log calculations displays an slight increase from FY 2001 through FY 2005. The actuarial firm calculations forecasted a decline in overall admissions in FY 2001, and will level off over the remaining four fiscal years. There are a number of assumptions that could be the cause of the differences between the two curves.

First, M & R's forecast was completed in FY 2000 and the data used to forecast did not include 9 months of FY 2000. Secondly, they forecasted that medicine service would increase admissions by 11.3% in FY 2001 but only have a modest increase of 1.4% for FY 2002 and FY 2003, where admissions will start to decline (see Figure 32). The inverse log curse for Medicine admissions indicates a less aggressive increase in FY 2001 than the actuarial firm forecast, but a steady increase over the next four fiscal years. This is mainly due to the last two FY steep increases in admissions for Medicine. The inverse log equation places more weights on the most resent years than the earlier years. The inverse log forecasted approximately the same number of admissions as the actuarial

firm in FY 2005, but if Medicine continues as forecasted by this study, admissions will increase well into the later part of the decade. This curve would definitely change if FY 2001 data recorded a decrease and the inverse log figures were calculated again. Finally, M & R's forecasts were made on a global level and did not study each system individually for prior performance. They made their forecasts expecting declines in Surgery and Mental Health, because they believed that the VHA overall had not moved as quickly as commercial health care to outpatient care.

M & R also predicted that the VA had further to go and would need to move more of Surgery and Mental Health services to an outpatient basis. STVHCS has persistently been moving toward outpatient care over the last 6 to 7 years as revealed by the census data. M & R forecasted a 20% decrease in Surgery and a 31% decrease in Mental Health using past global VHA numbers instead of past system numbers. The inverse log calculations indicate Surgery admissions will decrease over the years but not until after the initial increase in FY 2001. The actuarial firms forecast for Surgery forecasts a large decrease in FY 2001, then a slight increase for two years with a leveling off in FY 2004 and FY 2005 (see Figures 33). M & R's forecast for Mental Health revealed the same trend line characteristics as the Surgery actuarial trend line, while the inverse log curve forecasts a steady increase through the next five fiscal years (see Figure 34).

Cost Forecasting

The VEV costs for FY 2001 through FY 2005 were predicted using the forecasted total VEV admissions, the FY 2000 average cost per VEV admission, with a combined inflation and cost of living increase of 6% added annually. Table 17 represents VEV admissions, average cost per VEV admission, and total VEV costs by year for all services and a combined total. Figures 35 and 36 illustrates that average cost per VEV admissions

and total costs will continue to increase for all services and a combined total over the next five fiscal years.

Table 17

STVHCS ALMD Actual (FY 2000) and Forecasted VEV Admissions (FY 2001 – FY 2005), Used to Forecast Cost Per VEV Admission and Total VEV Cost by Services and Combined Total for FY 2001 – FY 2005

FY	MEDICINE SERVICE TOTAL VEV ADMISSIONS	MEDICINE AVG VEV COST PER ADMISSION	MEDICINE SERVICE TOTAL VEV COSTS	SURGERY SERVICE TOTAL VEV ADMISSIONS	SURGERY AVG VEV COST PER ADMISSION	SURGERY SERVICE TOTAL VEV COSTS
2000	2329	$ 7,900	$ 18,400,262	885	$ 14,166	$ 12,537,313
2001	2373	$ 8,375	$ 19,872,757	791	$ 15,016	$ 11,878,581
2002	2501	$ 8,877	$ 22,201,378	782	$ 15,917	$ 12,453,699
2003	2631	$ 9,410	$ 24,756,712	775	$ 16,872	$ 13,069,537
2004	2765	$ 9,974	$ 27,578,657	768	$ 17,885	$ 13,727,217
2005	2902	$ 10,573	$ 30,681,830	761	$ 18,958	$ 14,428,205

FY	MENTAL HEALTH TOTAL VEV ADMISSIONS	MH AVG VEV COST PER ADMISSION	MENTAL HEALTH TOTAL VEV COSTS	ACUTE CARE & MENTAL HEALTH PRODUCT LINE TOTAL ADM	AC & MH AVG VEV COST PER ADMISSION	AC & MH PRODUCT LINE TOTAL VEV COSTS
2000	1635	$ 4,540	$ 7,423,038	4849	$ 7,911	$ 38,360,613
2001	1742	$ 4,812	$ 8,383,001	4906	$ 8,181	$ 40,134,338
2002	1767	$ 5,101	$ 9,013,374	5050	$ 8,647	$ 43,668,452
2003	1791	$ 5,407	$ 9,681,864	5196	$ 9,143	$ 47,508,113
2004	1813	$ 5,732	$ 10,391,355	5345	$ 9,671	$ 51,697,229
2005	1834	$ 6,076	$ 11,144,828	5497	$ 10,233	$ 56,254,863

This table reveals that all the services will increase their average VEV cost per admissions by 33.8%, but due to the number of VEV admissions either increasing or decreasing, the total VEV costs percentages will be different. For example, Medicine service's VEV admissions will increase over the next five years, while Surgery service's VEV admissions will decrease, which means that Medicine will have a higher percentage

increase in total costs. Medicine service will increase their total VEV costs by approximately 67%, while Surgery service increases their total VEV cost by 15% and Mental Health increases by 50%. When all services are combined, the total VEV cost will increase by 47% over the next five years. The next logical step in forecasting cost is to look at what the total admissions are going to cost STVHCS. Combining VEV and non-VEV admissions, and utilizing the average cost for VEV admissions, table 18 was constructed to represent total costs by services with a combined total.

Table 18

STVHCS ALMD Actual (FY 2000) and Forecasted Total Admissions (FY 2001 – FY 2005), Used to Forecast Cost Per Total Admission and Total Cost by Services and Combined Total for FY 2001 – FY 2005

FY	MEDICINE SERVICE TOTAL ADMISSIONS	MEDICINE AVG COST PER ADMISSION	MEDICINE SERVICE TOTAL COSTS	SURGERY SERVICE TOTAL ADMISSIONS	SURGERY AVG COST PER ADMISSION	SURGERY SERVICE TOTAL COSTS
2000	4866	$ 7,900	$ 38,443,828	1797	$ 14,166	$ 25,457,120
2001	5126	$ 8,375	$ 42,927,835	1872	$ 15,016	$ 28,110,793
2002	5194	$ 8,877	$ 46,107,141	1828	$ 15,917	$ 29,098,244
2003	5272	$ 9,410	$ 49,607,520	1790	$ 16,872	$ 30,198,452
2004	5359	$ 9,974	$ 53,451,726	1756	$ 17,885	$ 31,406,717
2005	5453	$ 10,573	$ 57,652,659	1726	$ 18,958	$ 32,720,930

FY	MENTAL HEALTH TOTAL ADMISSIONS	MH AVG COST PER ADMISSION	MENTAL HEALTH TOTAL COSTS	ACUTE CARE & MENTAL HEALTH PRODUCT LINE TOTAL ADM	AC & MH AVG COST PER ADMISSION	AC & MH PRODUCT LINE TOTAL COSTS
2000	2726	$ 4,540	$ 12,376,270	9389	$ 8,124	$ 76,277,218
2001	2871	$ 4,812	$ 13,814,991	9869	$ 8,598	$ 84,853,619
2002	2914	$ 5,101	$ 14,863,425	9936	$ 9,065	$ 90,068,811
2003	2954	$ 5,407	$ 15,975,567	10016	$ 9,563	$ 95,781,539
2004	2993	$ 5,732	$ 17,156,260	10108	$ 10,092	$102,014,703
2005	3030	$ 6,076	$ 18,410,510	10209	$ 10,656	$108,784,099

This table will assist STVHCS in planning and budgeting over the next five years, which shows that the combined costs will increase by 42.6%. This percentage is lower than the total combined VEV cost, due to the forecasted decrease in non-VEV admissions over the years in the Acute Care product line. Total costs are illustrated in Figure 37.

CONCLUSION

The data in the statistical analysis section reveals that the admissions VEV ratio will increase as the years increase. This statement negates the null hypothesis and formalizes the alternate hypothesis, and assists in answering Dr. Bauer's question about VEV admission increases in FY 1999 and FY 2000. Even though the VEV ratio increased each year, FY 2000 was the first year that the VEV admissions accounted for most of the increase in overall admissions.

The forecasting trend performed on VEV admissions and BDOC, points toward increasing VEV utilization. VEV admissions and BDOC will surpass non-VEV admissions and BDOC sometime in FY 2001 and will continue increasing past FY 2005. Total admissions and total BDOC will increase even though there is a forecasted decline in non-VEV utilization over the next five FY. Nevertheless, as with any system that is controlled by politics, situations could change. Congress could legislate an increase in benefits for the VEV or cut services, which would affect the forecasted admissions and costs. For example, due to Agent Orange and other herbicides used in Vietnam, the VA mandated in FY 2001 that all veterans that were in Vietnam, who now have type-II diabetes, will be eligible for VA benefits. The results of this decision, in workload or financially has not been experienced by the VHA. Other prognosis could also change the forecast outcomes in the near future. There are moves by the Veterans Service

Organizations to add mental health services at the Community Base Outpatient Clinics, which could decrease inpatient admissions and the cost of care.

The forecasted cost trend analysis points toward increases in both average costs per admission and total costs over the next five fiscal years in all services. Even though Surgery service admissions have been forecasted to decline, costs for services will increase due to inflation and cost of living increases. At some point in time costs for all services will have to level off. This will occur when VEV admissions level off and non-VEV admissions greatly decrease.

RECOMMENDATIONS

Given the trends that were recognized, FY 2001 forecast should be fairly close to actual FY 2001 admissions and BDOC. Due to the dynamics of the VA, the future years forecasting should be continued by updating the forecast mechanism each FY. This will continue to assist administration in recognizing where resources are being utilized or where they are needed.

As this research progressed and as previously discussed, additional questions arose. This study was unable to demonstrate the severity of the VEV population studied compared to the total veteran population who utilized services at STVHCS. Even though DRG numbers were collected for each unique admission, the severity indexing could not be accomplished, due to time constraints and the span of this study. Using the data from this study, a severity trend could be accomplished to assist clinical administration in recognizing where emphasis should be placed in graduate education. It should also help in resource allocation.

Other areas of study on VEV that could be accomplished are trend studies on enrollment compared to inpatient care. Also, a comprehensive study could be performed

on the age of the VEV, to understand why the average age in Medicine and Surgery services only increased by one year and Mental Health's inpatient age remained constant. As these questions are answered, STVHCS will be able to better understand the VEV population on how best to care and serve them.

References

Anonymous (1999, March). Department of Veterans Affairs, VA fact sheet. VA geriatrics research highlights. Retrieved November 19, 2000 from the World Wide Web: http://www.va.gov/pressrel/99greec.htm

Anonymous (2000). Department of Veterans Affairs, 2001 budget. Retrieved September 29, 2000 from the World Wide Web: http://www.va.gov/budget/summary/2001Budget.pdf

Anonymous (2000). Department of Veterans Affairs, Strategic plan FY 2001 - 2006. Retrieved October 6, 2000 from the World Wide Web: http://www.va.gov/opanalysis/strategicplan00/Contents.htm

Anonymous (2000, March). The changing veterans population: 1990 – 2020. Retrieved September 29, 2000 from the World Wide Web: http://www.va.gov/opa/vetpopbook3-17-00pon.pdf

Anonymous (2000). Department of Veterans Affairs, 2001 budget: Data verification and validation. Retrieved November 27, 2000 from the Veterans Affairs Wide Web: http://vaww.va.gov/budget/plan2001/validation.htm

Barrett, D. H., Green, M. L., Morris, R., Giles, W. H., & Croft, J. B. (1996). Cognitive functioning and posttraumatic stress disorder. American Journal of Psychiatry, 153 (11), 1492-1494.

Beckham, J. C., Moore, S. D., Feldman, M. E., Hertzberg, M. A., Kirby, A. C., & Fairbank, J. A. (1998). Health status, somatization, and severity of posttraumatic stress disorder in Vietnam combat veterans with posttraumatic stress disorder. American Journal of Psychiatry, 155 (11), 1565-1569.

Beyea, S., & Nicoll, L. H. (1999). Using data to support decision making. AORN Journal, 70 (5), 912-913.

Bonini, C. P., Hausman, W. H., Bierman, H., Jr. (1997). Forecasting. In, Quantitative Analysis for Management (9th ed.) (pp. 473-508). Chicago, IL: The McGraw-Hill Companies, Inc.

Boscarino, J. A. (1997). Diseases among men 20 years after exposure to severe stress: Implications for clinical research and medical care. Psychosomatic Medicine, 59 (6), 605-614.

Bremner. J. D., Innis, R. B., Ng, C. K., Staib, L. H., Salomon, R. M., Bronen, R. A., Duncan, J., Southwick, S. M., Krystal, J. H., Rich, D., Zubal, G., Dey, H., Soufer, R., & Charney, D. S. (1997). Positron emission tomography measurement of cerebral metabolic correlates of yohimbine administration in combat-related posttraumatic stress disorder. Archives of General Psychiatry, 54 (3), 246-254.

Bremner, J. D., Southwick, S. M., Darnell, A., & Charney, D. S. (1996). Chronic PTSD in Vietnam combat veterans: Course of illness and substance abuse. American Journal of Psychiatry, 153 (3), 369-375.

Bullman, T. A., Kang, H. K., (1996). The risk of suicide among wounded Vietnam veterans. American Journal of Public Health, 86, (5), 662-667.

Bullman, T. A., Kang, H. K., Talbott, J. A. (Eds.), (1996). Posttraumatic stress disorder and the risk of traumatic deaths among Vietnam veterans. Year Book of Psychiatry & Applied Mental Health, 1996 (7), 267-268.

Bureau of Labor Statistics (1999). Labor force statistics from the current population survey. Table 4. Employment status of male veterans 18 years and over by period of service, presence of service-connected disability, and reported disability rating,

September 1999, not seasonally adjusted. Retrieved September 29, 2000 from the World Wide Web: http://stats.bls.gov/news.release/vet.t04.htm

The Center for Disease Control (1988). The Center for Disease Control Vietnam experience study: Health status of Vietnam veterans, II: physical health. JAMA, 259, 2708-2714.

Druss, B. G., Rohrbaugh, R. M., & Rosenheck, R. A. (1999). Depressive symptoms and health costs in older medical patients. The American Journal of Psychiatry, 156 (3), 477-479.

Eastaugh, S. R. (1998). Payment incentives, integrated systems, and cost management. In Health care finance: Cost, productivity, & strategic design (pp 10-12). Gaithersburg, Maryland: Aspen Publishers, Inc.

Feussner, J. R., Kizer, K. W., & Demakis, J. G. (2000). The Quality enhancement research initiative (QUERI). From evidence to action. Medical Care, 38 (6), (Suppl. QUERI), I-1-I-6.

Friedman, M. J. & Schnurr, P. P. (1995). The relationship between trauma, PTSD, and physical health in neurobiological and clinical consequences of stress. In M. J. Friedman, D. S. Charney, & A. Y. Deutch (Eds.), Normal adaptation of PTSD (pp. 507-524). New York, New York: Lippincott-Raven.

Getzen, T. E. (1997). Costs: The flow of funds out of the Hospital. In, Health economics: Fundamentals and flows of funds (page 166). New York, NY: John Wiley & Sons, Inc.

Gibbon, D. (1998). Selecting healthcare assessment tools: putting issues of validity and reliability into a wider context. Nurse Researcher, 5 (3), 5-15.

Hackler, C. (1994). Introduction: Health care reform for an aging population. In C. Hackler (Eds.), Health care for an aging population (pp. 1-18). Albany, NY: State University of New York Press.

Hankins, C. S., Spiro, A. III., Miller, D. R., & Kazis, L. (1999). Mental disorders and mental health treatment among U.S. Department of Veterans Affairs outpatients: The veterans health study. The American Journal of Psychiatry, 156 (12), 1924-1930.

Hendricks, A. M., Remler, D. K., & Prashker, M. J. (1999). More or less? Methods to compare VA and non-VA health care costs. Medical Care, 37 (4), (Suppl. VA), AS54-AS62.

Janssen, R. (1991). Hospital management by product lines. Health Services Management Research, 4 (1), 25-31.

Jecker, N. S., & Pearlman, R. A. (1994) Designing ethical alternatives to age-based rationing. In C. Hackler (Eds.) Health Care for an Aging Population (pp. 121-144). Albany, NY: State University of New York Press.

Johnson, D. R., Rosenheck, R., Fontana, A., Lubin, H., Charney, D., & Southwick, S. (1996). Outcome of intensive inpatient treatment for combat-related posttraumatic stress disorder. American Journal of Psychiatry, 153 (6), 771-777.

Keane, T. M., Kaloupek, D. G., & Kolb, L. C. (1998, Winter). VA cooperative study #334: I. Summary of findings on the psychophysiological assessment of PTSD. PTSD Research Quarterly, 9 (1), 1-7

Kizer, K. W., Demakis, J. G., & Feussner, J. R. (2000). Reinventing VA health care: Systematizing quality improvement and quality innovation. Medical Care, 38 (6), (Suppl. QUERI), I-7-I-16.

Khuri, S. F., Daley J., Henderson, W., Barbour, G., Lowry, P., Irvin, G., Gibbs, J., Grover, F., Hammermeister, K., Stremple, J. F., Aust, J. B., Demakis, J., Deykin, D, McDonald, G., and participants in the National Veterans Administration Surgical Risk Study. (1995). The national veterans administration surgical risk study: Risk adjustment for the comparative assessment of the quality of surgical care. Journal of the American College of Surgeons, 180 (5), 519-531.

Lewis, C. D., (1982). Curve fitting-curves that can be expressed by the equation of a straight line. In, Industrial and Business Forecasting Methods (pp.92-110). Boston, MA: Butterworth & Co. Ltd.

Lewis, C. D., (1982). Curve fitting-curves that can be expressed by the modified exponential curve. In, Industrial and Business Forecasting Methods (pp.92-110). Boston, MA: Butterworth & Co. Ltd.

Marks, S. M., Taylor, Z., Burrows, N. R., Qayad, M. G., & Miller, B., (2000). Hospitalization of homeless persons with tuberculosis in the United States. American Journal of Public Health, 90 (3), 435-438.

Pankratz, L., & Jackson, J., (1994). Habitually wandering patients. The New England Journal of Medicine 331 (26), 1752-1755.

Portney, L. G., Watkins, M. P., (2000). Reliability. In Foundations of clinical research applications to practice (2nd ed.) (pp. 61-77). Upper Saddle River, NJ: Prentice Hall Health

Portney, L. G., Watkins, M. P., (2000). Validity of measurements. In Foundations of clinical research applications to practice (2nd ed.) (pp. 79-112). Upper Saddle River, NJ: Prentice Hall Health

Rosenheck, R., & Kizer, K. W., (1998). Hospitalization and the homeless. The New England Journal of Medicine 339 (16), 1166-1167.

Rosenheck, R., & Massari, L., (1991). Psychiatric inpatient care in the VA: Before, during, and after DRG-based budgeting. American Journal of Psychiatry, 148 (7), 888-891.

Rosenheck, R., & Massari, L., Astrachan, B. M., (1990). The impact of DRG-based budgeting on inpatient psychiatric care in veterans administration medical centers. Medical Care, 28 (2), 124-134.

Schneider, E. L., & Guralnik, J. M. (1990). The aging of America: Impact on health care costs. Journal of the American Medical Association, 263, 2335-2340.

Schnurr, P. P., (1998, Spring). VA cooperative study #420: Group treatment of PTSD. PTSD Research Quarterly, 9 (2), 6-7.

Sultz, H. A., & Young, K. M. (1999). Financing health care. In, Health care USA, Understanding its organization and delivery (pp. 227-229). Gaithersburg, Maryland: Aspen Publishers, Inc.

VA links Agent Orange and diabetes. (2000, November 9). Department of Veterans Affairs: News Release, Retrieved November 10,2000 from the World Wide Web: http://www.va.gov/pressrel/aodiab.htm

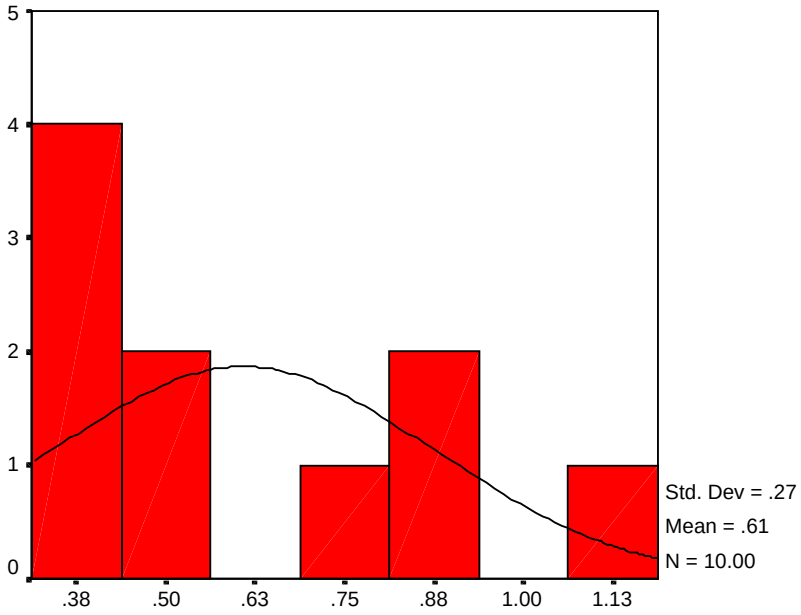
Varney, N. R., (1998, July 16). Statement of Niles R. Varney, Ph.D., Director of Training, Iowa City VA Medical Center before the Subcommittee on Benefits, House Committee on Veterans Affairs. Department of Veterans Affairs: Office of Congressional Affairs, Retrieved November 10,2000 from the Veterans Affairs Wide Web: http://vaww.va.gov/OCA/16JY98NV.htm

Veterans Health Affairs. (1999, December). *VHA Actuarial Projects, FY2001 - FY2010.* Washington, DC: Author. Milliman & Robertson Actuarial Firm. Retrieved from KLF database on VA Intranet: http://klfmenu.med.va.gov/planning/enrollcnt_costdata_options.ASP

Zatzick, D. F., Marmar, C. R., Weiss, D. S., Browner, W. S., Metzler, T. J., Golding, J. M., Stewart, A., Schlenger, W. E., & Wells, K. B., (1997). Posttraumatic stress disorder and functioning and quality of life outcomes in a nationally representative sample of male Vietnam veterans. American Journal of Psychiatry, 154 (12), 1690-1695.

Figure Caption

Figure 1. S



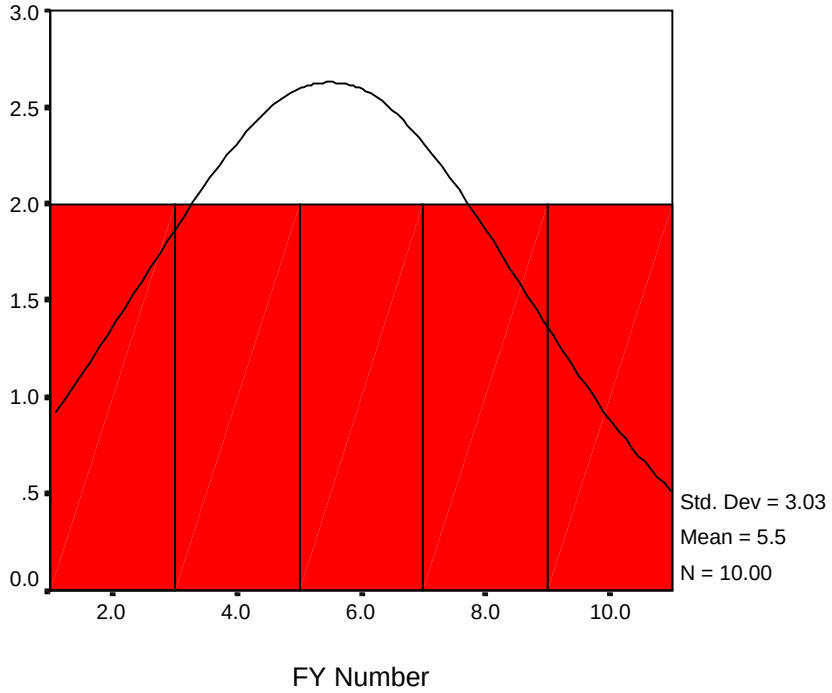


Figure Caption

Figure 2. Graphic comparison of least-square regression.

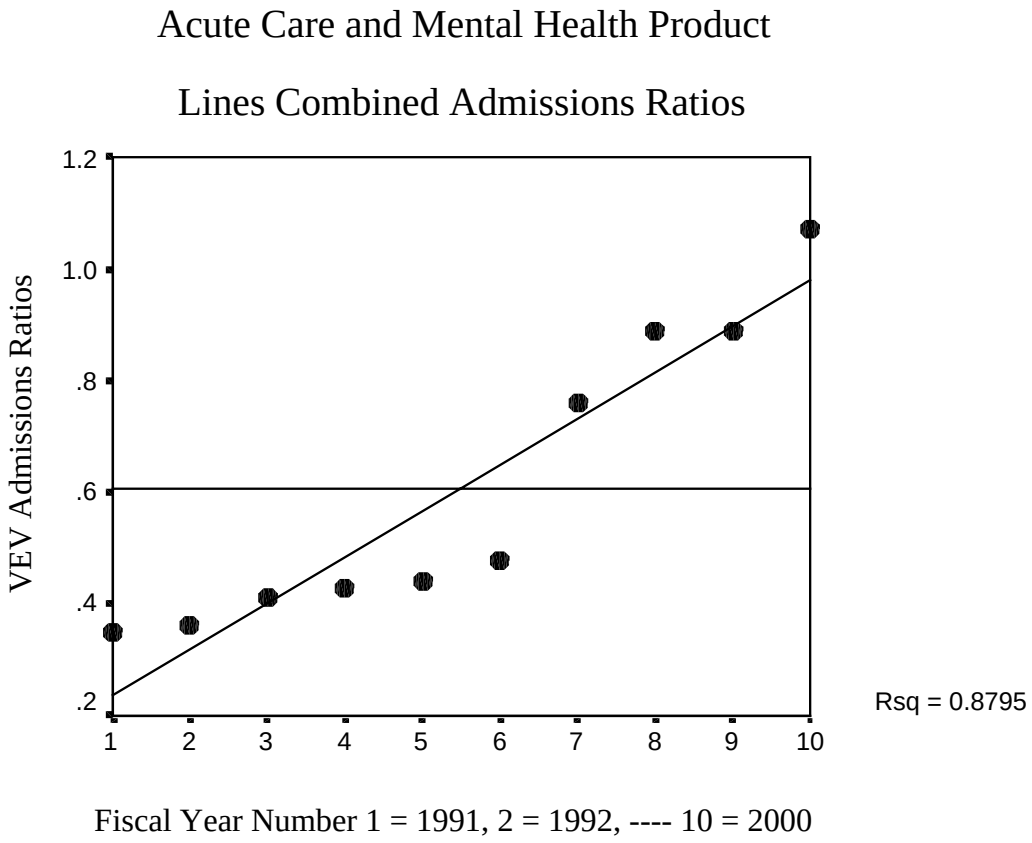


Figure Caption

Figure 3. Calculations required to fit inverse log curve to Medicine Service VEV admissions.

MEDICINE VEV ADMISSIONS

FY	$X=t$	t^2	$T = \log_e t$	T^2	$T\ (1/y)$	y	y^2	$1/y^2$	$Y_t = \log_e y_t$	Y^2_t	$1/y$	Ty	ty
1991	1	1	0.00	0.00	0.00000	1014	1028196	0.00000097	6.92	47.91	0.00099	0.00	1014
1992	2	4	0.69	0.48	0.00063	1100	1210000	0.00000083	7.00	49.04	0.00091	762.46	2200
1993	3	9	1.10	1.21	0.00079	1386	1920996	0.00000052	7.23	52.33	0.00072	1522.68	4158
1994	4	16	1.39	1.92	0.00094	1470	2160900	0.00000046	7.29	53.19	0.00068	2037.85	5880
1995	5	25	1.61	2.59	0.00104	1554	2414916	0.00000041	7.35	54.00	0.00064	2501.07	7770
1996	6	36	1.79	3.21	0.00089	2019	4076361	0.00000025	7.61	57.92	0.00050	3617.56	12114
1997	7	49	1.95	3.79	0.00093	2082	4334724	0.00000023	7.64	58.39	0.00048	4051.39	14574
1998	8	64	2.08	4.32	0.00118	1757	3087049	0.00000032	7.47	55.82	0.00057	3653.58	14056
1999	9	81	2.20	4.83	0.00109	2015	4060225	0.00000025	7.61	57.89	0.00050	4427.41	18135
2000	10	100	2.30	5.30	0.00099	2329	5424241	0.00000018	7.75	60.11	0.00043	5362.72	23290
	t_t	t^2_t	T_t	T^2_t	$T\,Y_t$	y_t	y^2_t	Y_t^2	Y_t	Y^2_t	$1/y_t$	Ty_t	ty_t
	55	385	15.10	27.65	0.0085	16726	29717608	0.000004	73.88	546.60	0.0064	27936.73	103191

TOTAL N = 10 Mean t = 5.50 e = 2.72 Mean y = 1672.60

Inverse Log Curve

Variable	dependent	independent
Form	$Y_t = 1/y_t$	$T = \log_e t$

n = 10 Y_t = 0.00641 Y_t^2 = 0.0000044 T = 15.10 T^2 = 27.65 $T\,Y_t$ = 0.00849

$$b = \frac{n\,(T\,Y_t) - T\,(Y_t)}{n\,T^2 - (T)^2} = \frac{-0.011971674}{48.36} = -0.0002476$$

$$a = \frac{Y_t - b\,(T)}{n} = \frac{0.010150}{10} = 0.0010150$$

$y_t = 1/(a + b \log_e t)$

y_t =	1	/	a	+	b	$\log_e$	t
y_t =	1	/	0.0010150	+	-0.0002476	2.40	11
y_t =	1	/	0.0010150	+	-0.0005936		
y_t =	1	/	0.0004214				
y_t =	2373						

Figure Caption

Figure 4. Percent of variance in the Acute Care and Mental Health Product Lines combined admissions ratios accounted for by fiscal year.

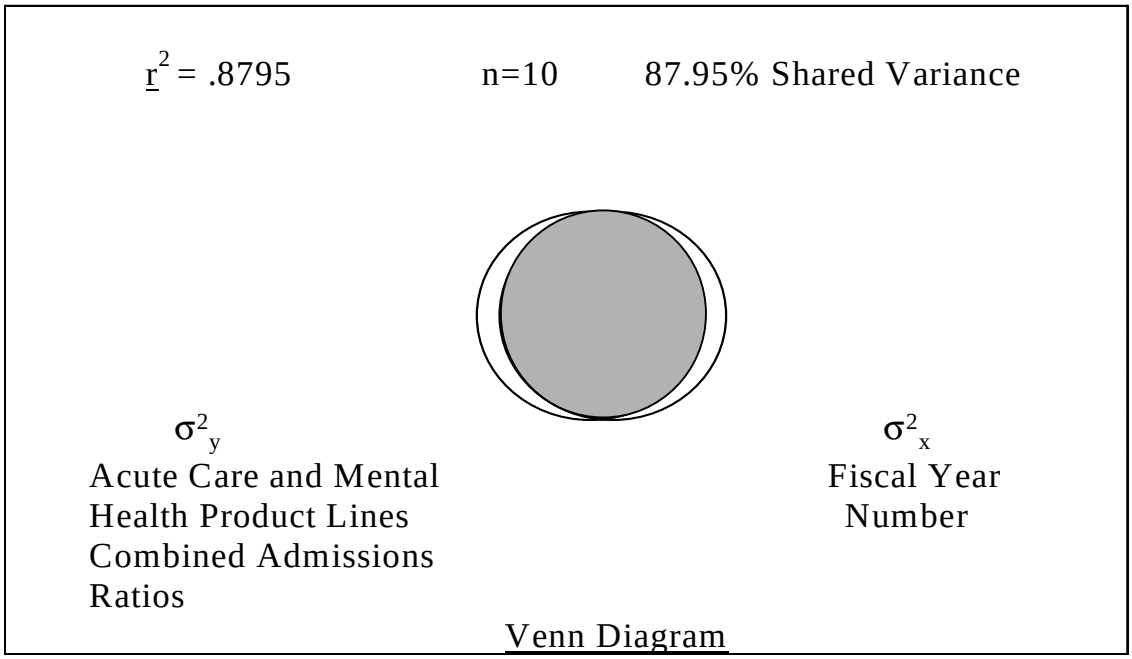


Figure Caption

Figure 5. STVHCS ALMD Acute Care and Mental Health Product Lines combined percentage of bed utilization, VEV percentage of BDOC, and facility bed totals for FY 1991 through FY 2000.

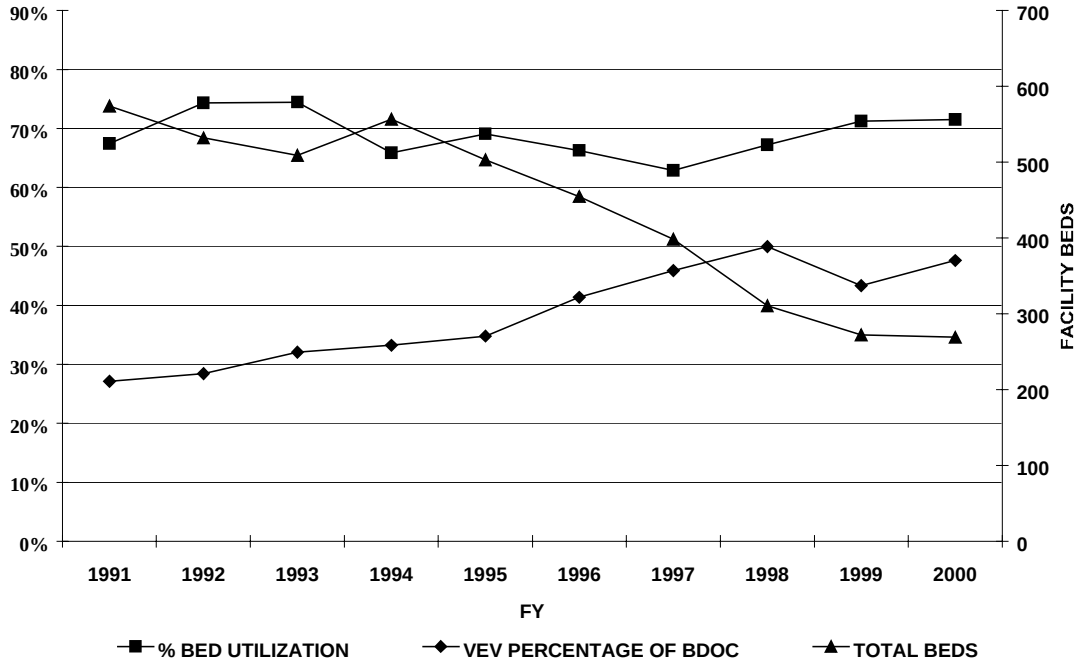


Figure Caption

Figure 6. STVHCS ALMD Acute Care and Mental Health Product Lines combined percentage of VEV BDOC compared to total cumulated BDOC.

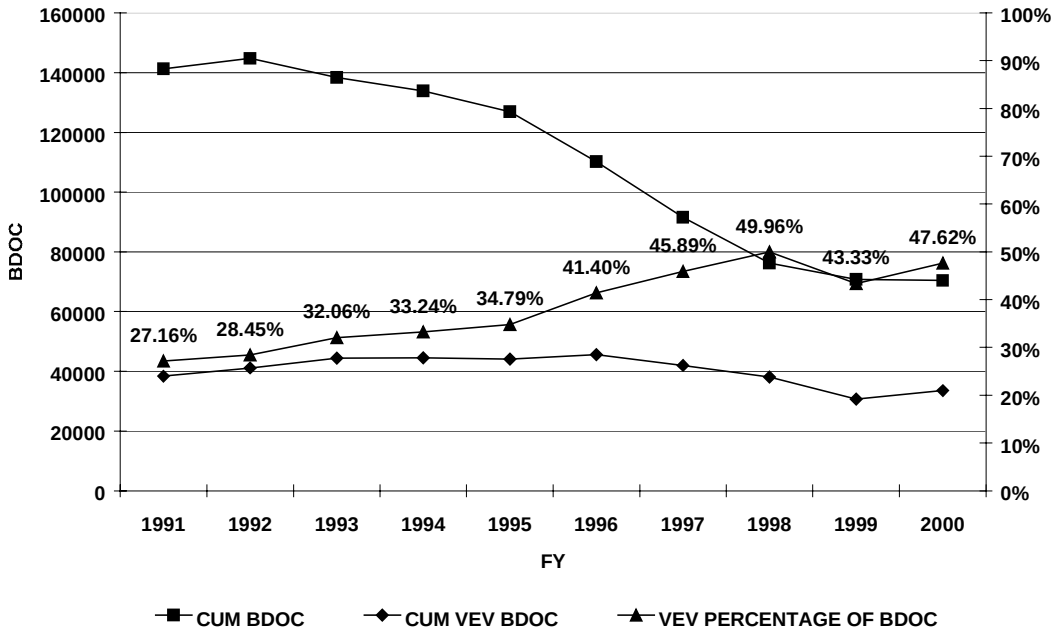


Figure Caption

Figure 7. STVHCS ALMD Percentage of bed utilization by services.

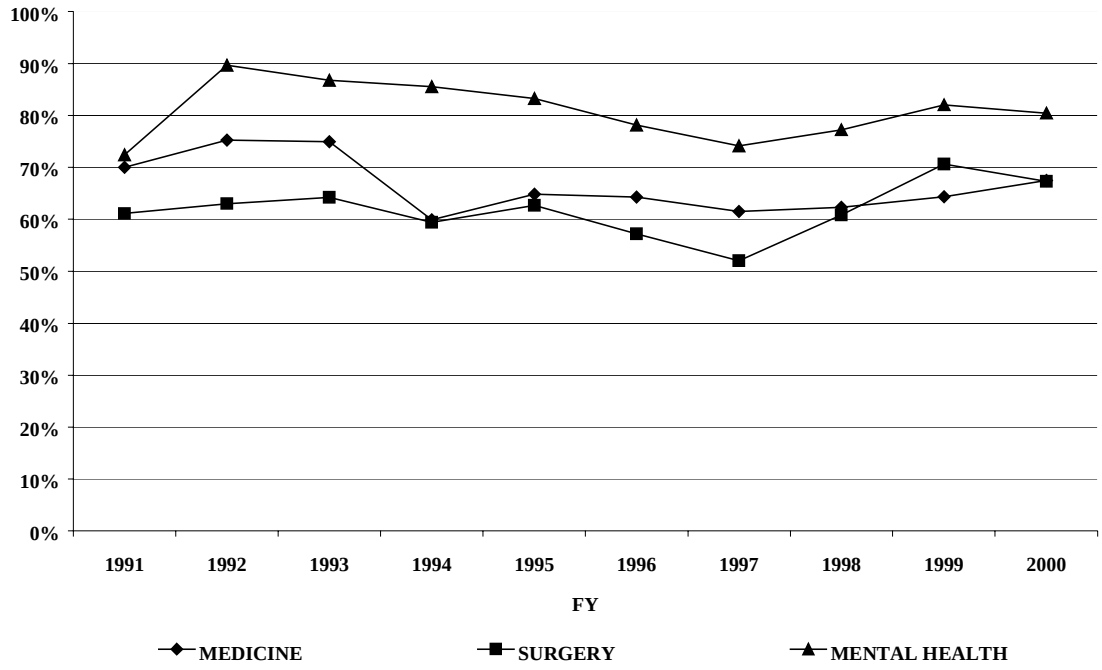


Figure Caption

Figure 8. STVHCS ALMD VEV average age by services and the Acute Care and Mental Health Product Lines combined.

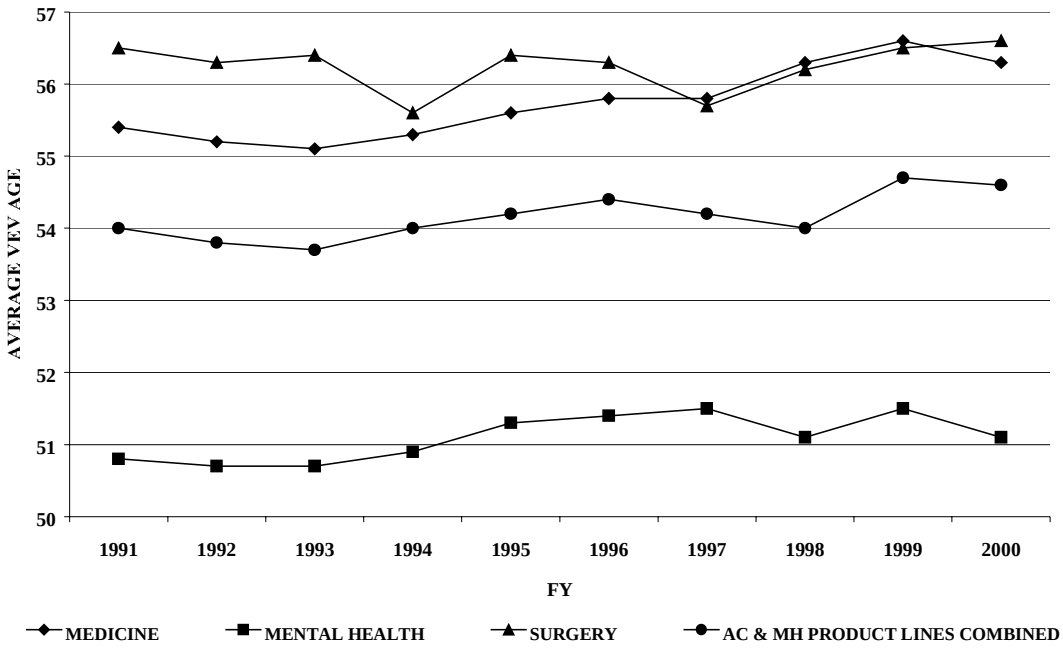


Figure Caption

Figure 9. STVHCS ALMD Acute Care and Mental Health Product Lines combined admissions.

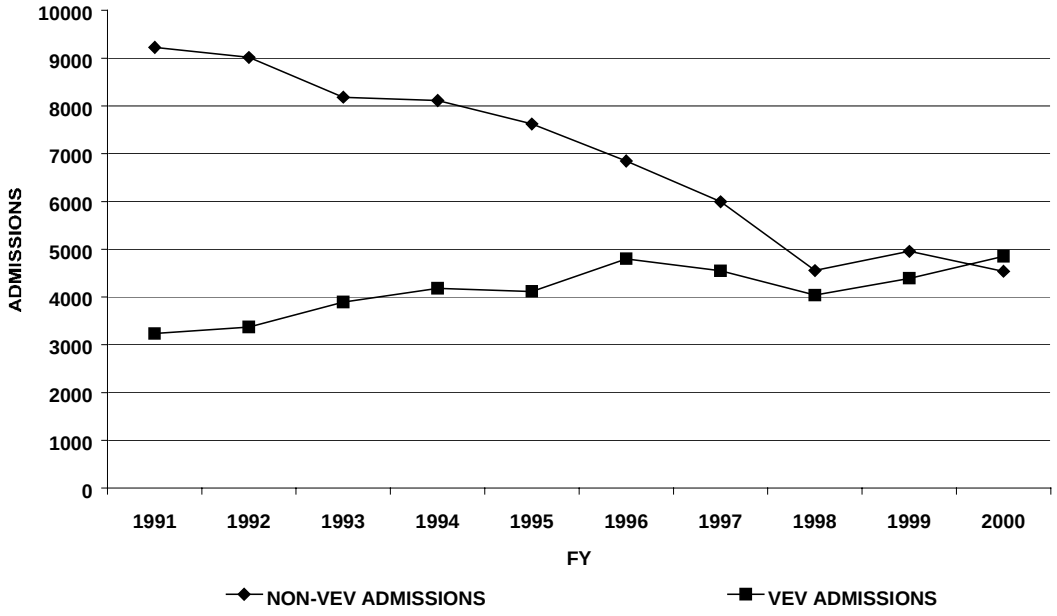


Figure Caption

Figure 10. STVHCS ALMD Medicine Service VEV admissions compared to non-VEV admissions.

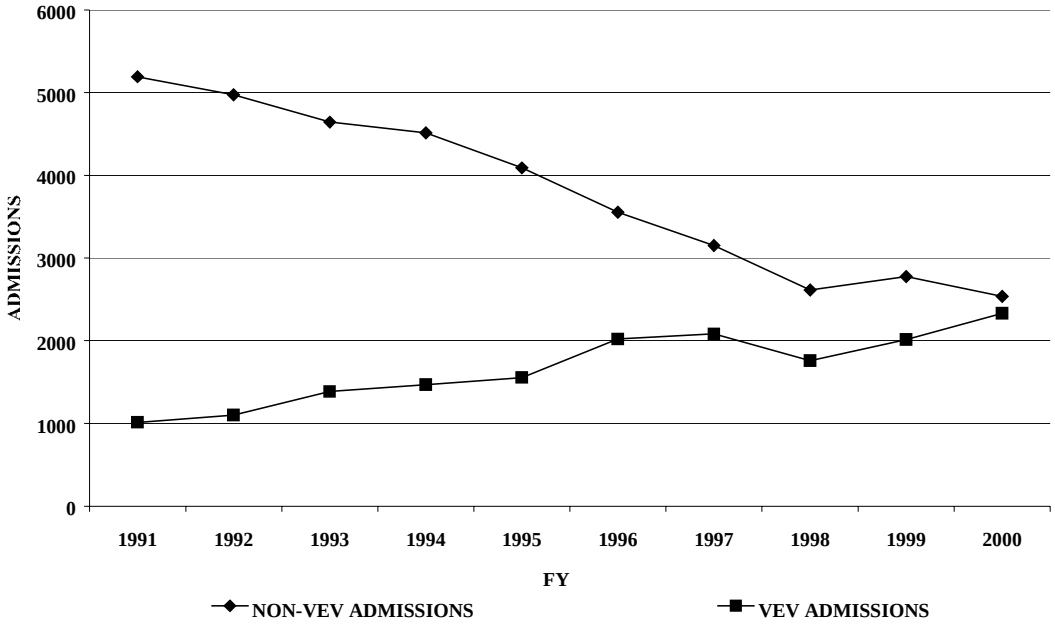


Figure Caption

Figure 11. STVHCS ALMD Surgery Service VEV admissions compared to non-VEV admissions.

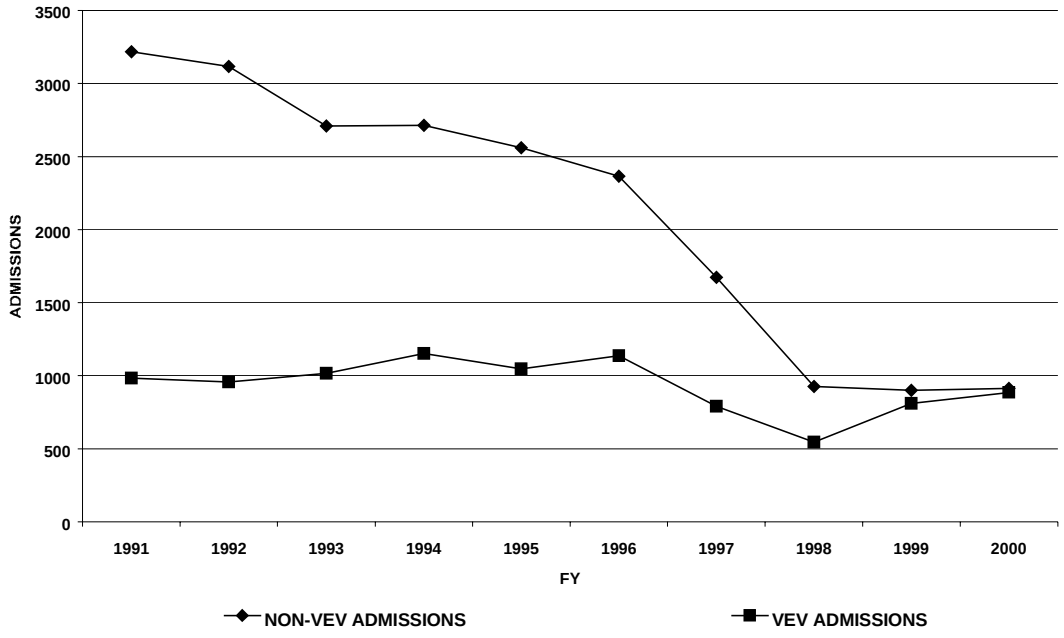


Figure Caption

Figure 12. STVHCS ALMD Mental Health Product Line VEV admissions compared to non-VEV admissions.

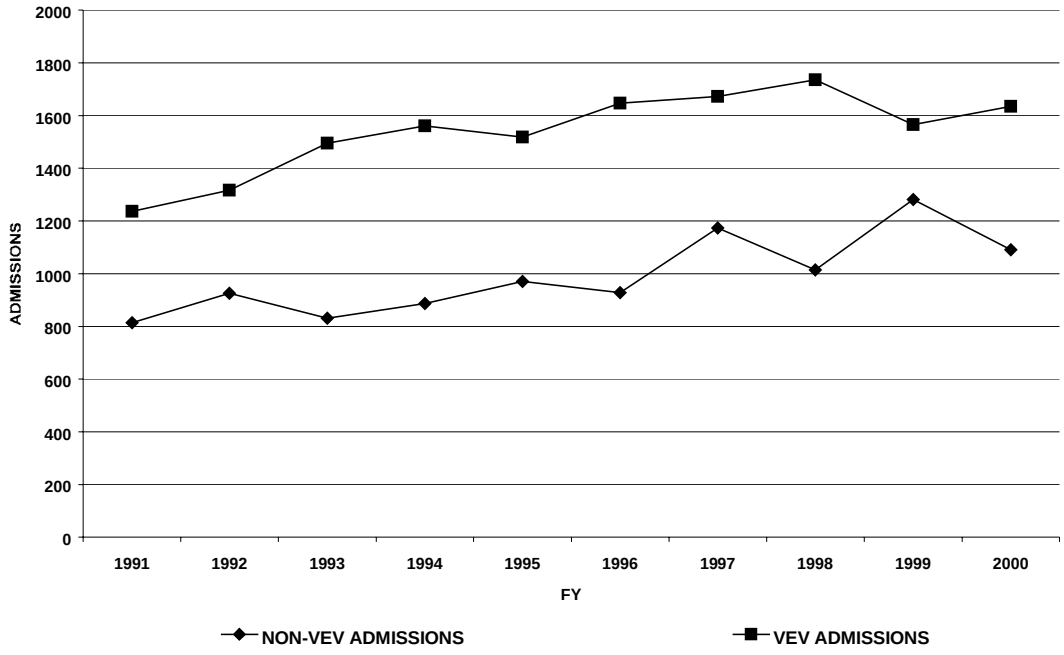


Figure Caption

Figure 13. STVHCS ALMD VEV admissions compared to non-VEV admissions ratios.

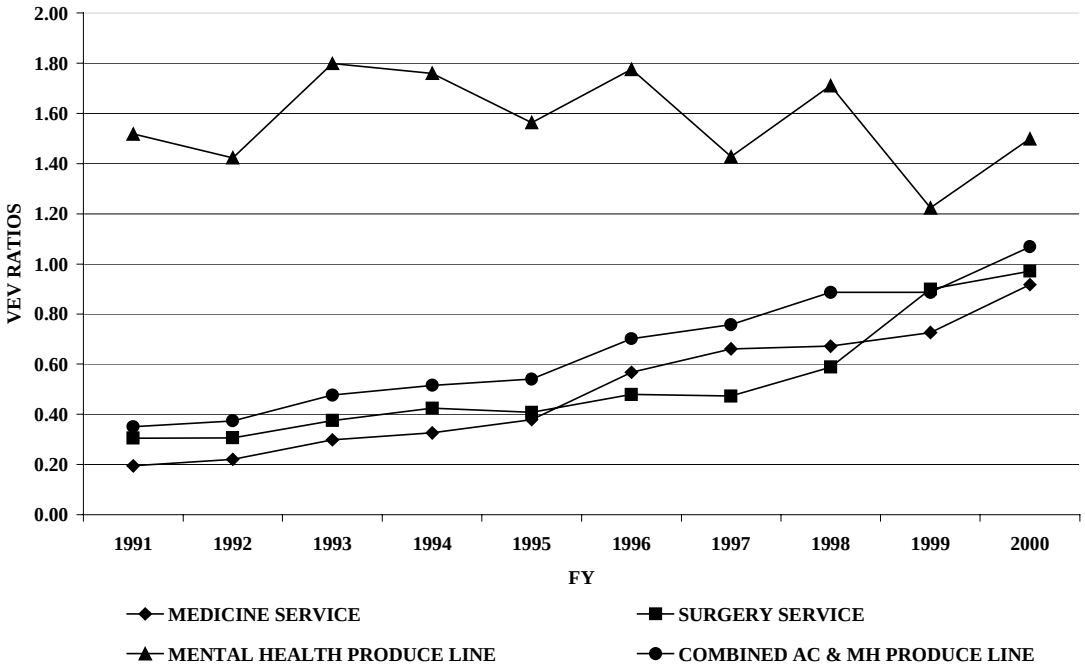


Figure Caption

Figure 14. STVHCS ALMD Acute Care and Mental Health Product Lines combined BDOC.

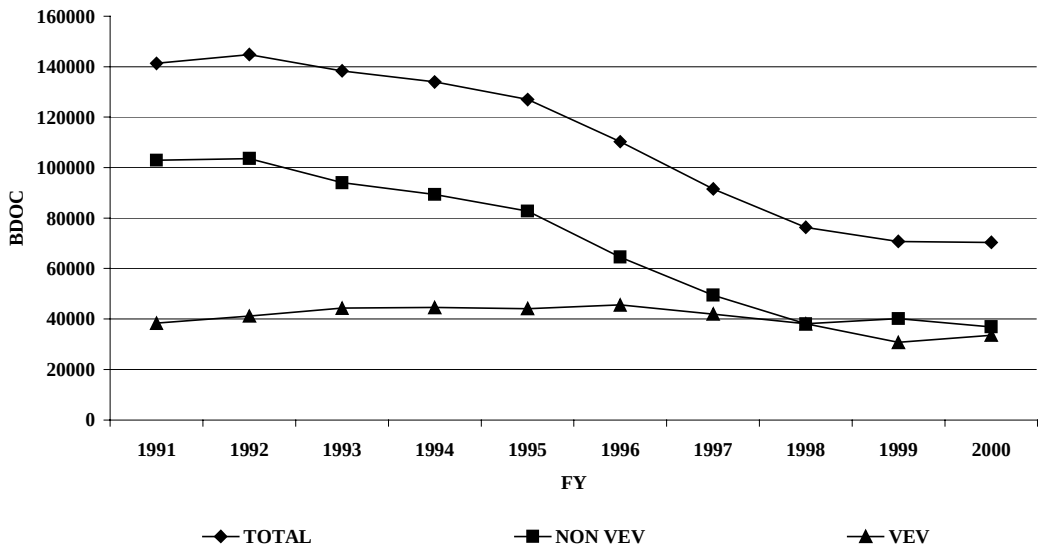


Figure Caption

Figure 15. STVHCS ALMD Medicine Service BDOC.

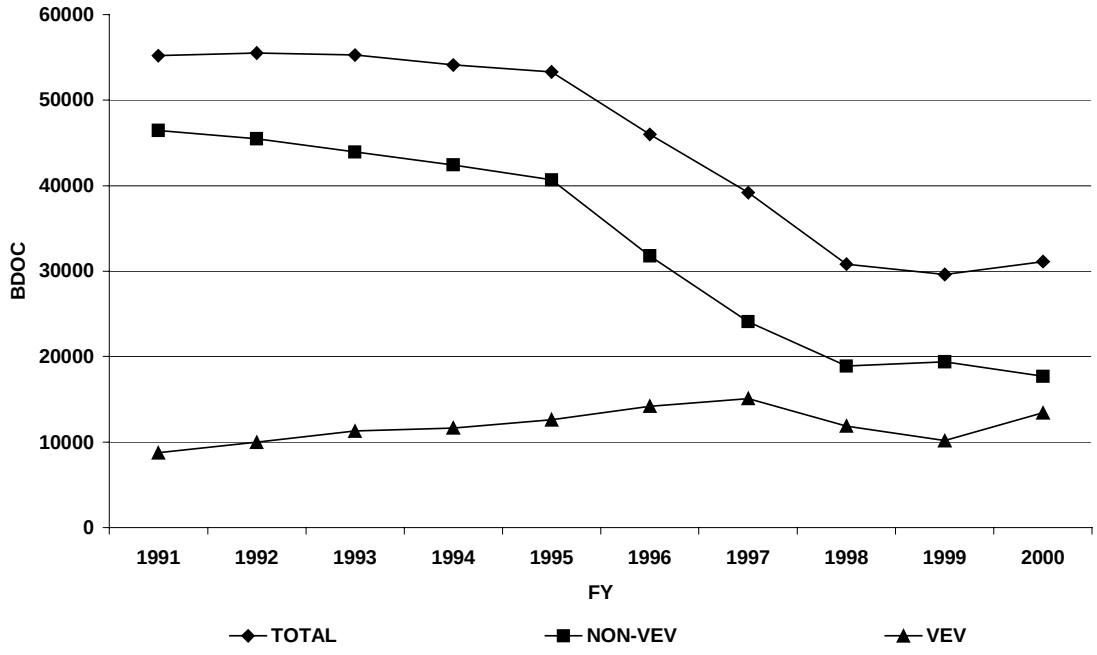


Figure Caption

Figure 16. STVHCS ALMD Mental Health BDOC.

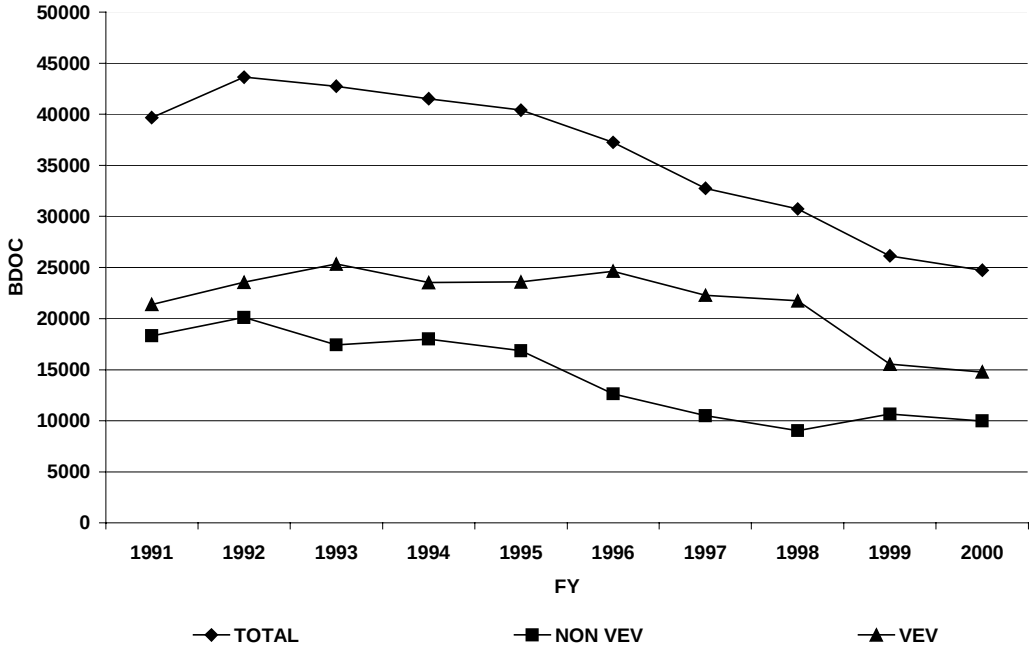


Figure Caption

Figure 17. STVHCS ALMD Surgery Service BDOC.

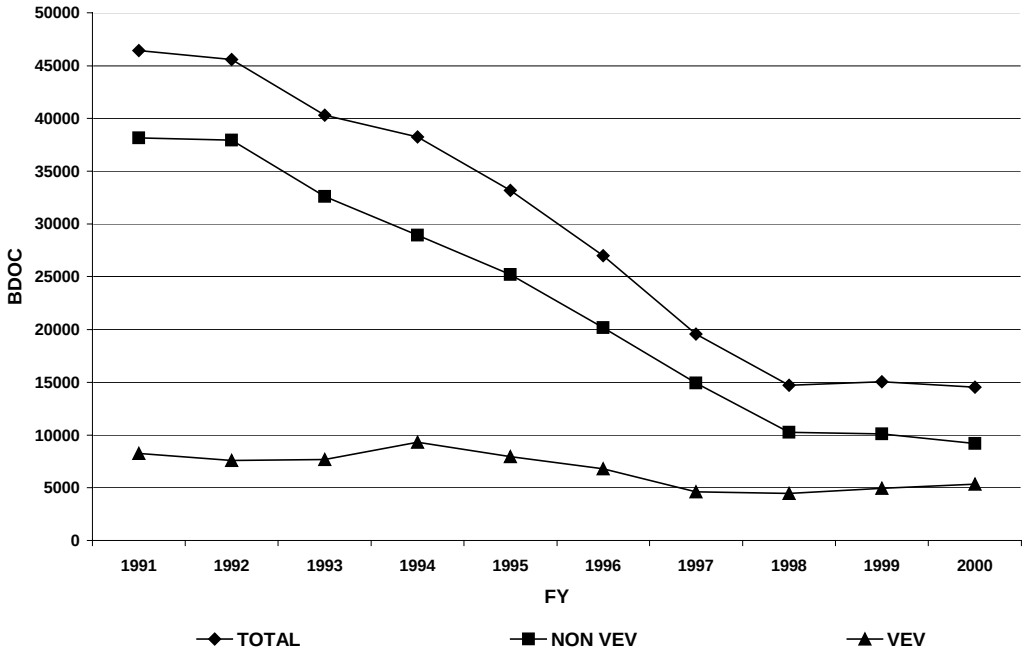


Figure Caption

Figure 18. STVHCS ALMD Acute Care and Mental Health Product Lines combined total VEV admissions and total VEV costs.

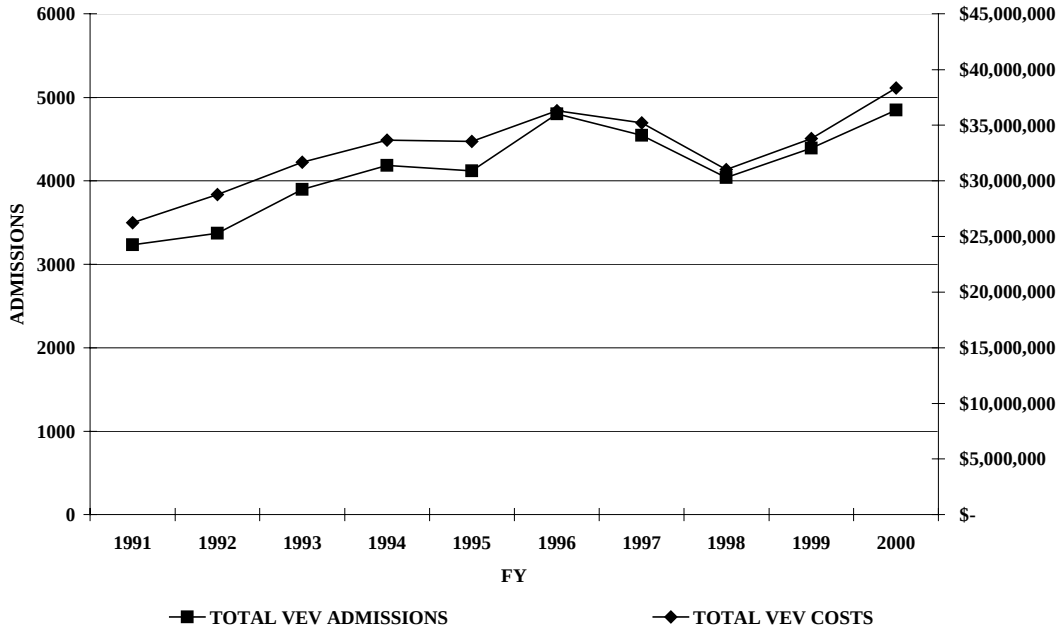


Figure Caption

Figure 19. STVHCS ALMD Acute Care and Mental Health Product Lines combined VEV admissions and average costs per VEV admissions.

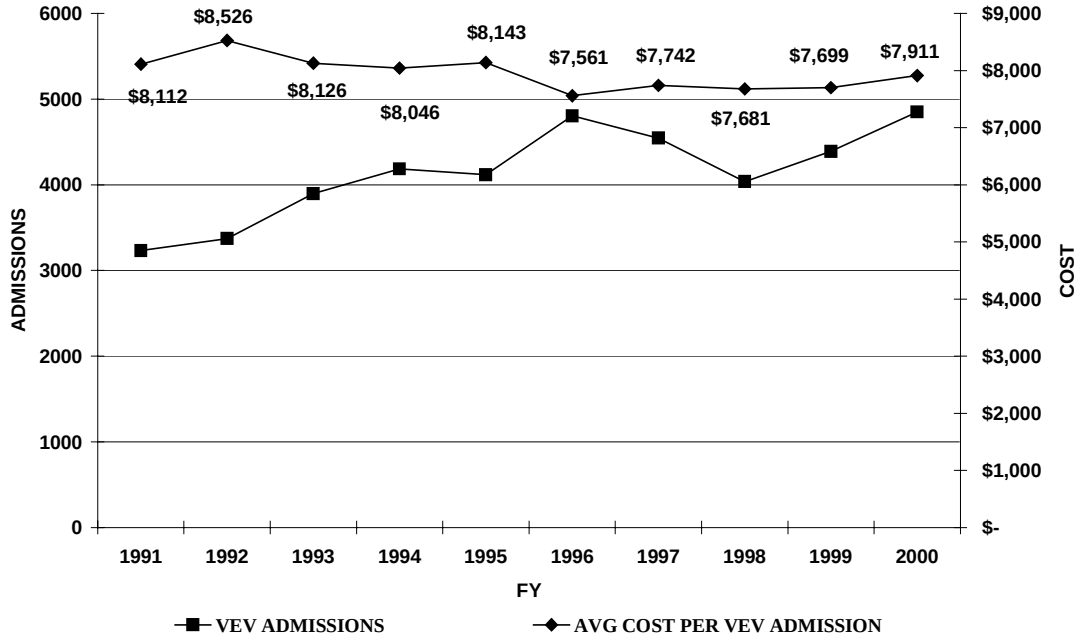


Figure Caption

Figure 20. STVHCS ALMD Medicine Service VEV admissions and average costs per VEV admissions.

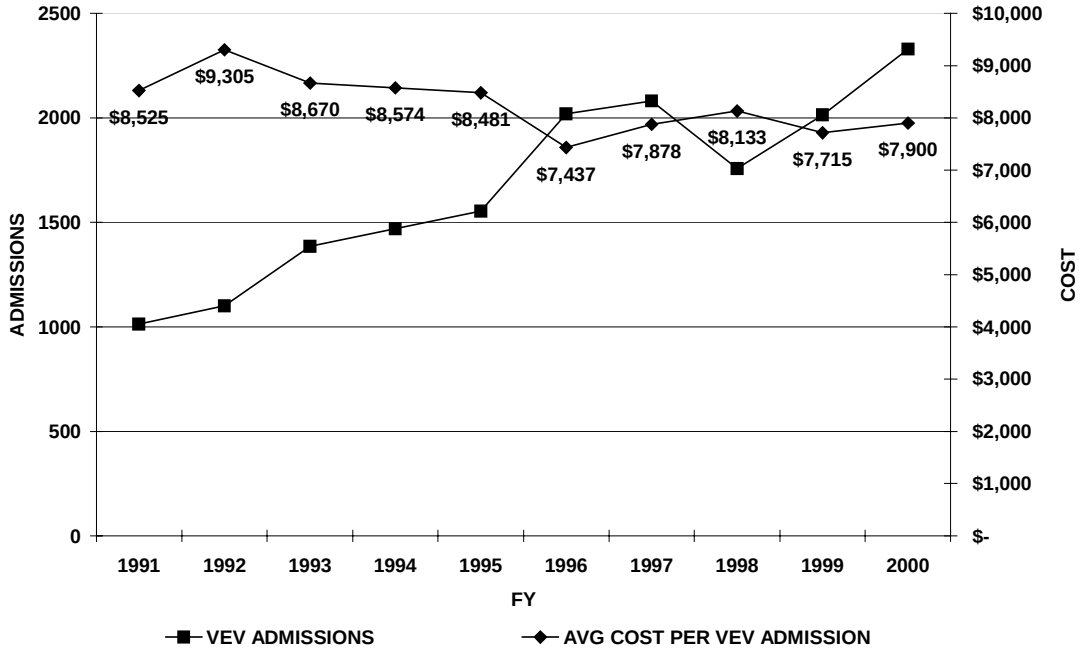


Figure Caption

Figure 21. STVHCS ALMD Mental Health VEV admissions and average costs per VEV admissions.

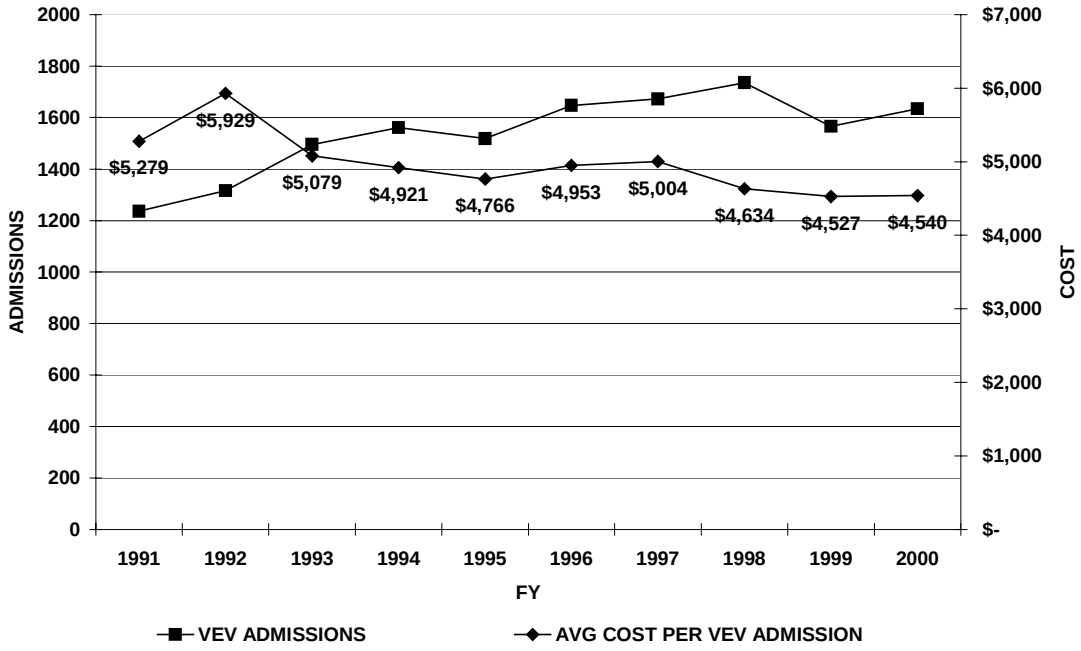


Figure Caption

Figure 22. STVHCS ALMD Surgery Service VEV admissions and average costs per VEV admissions.

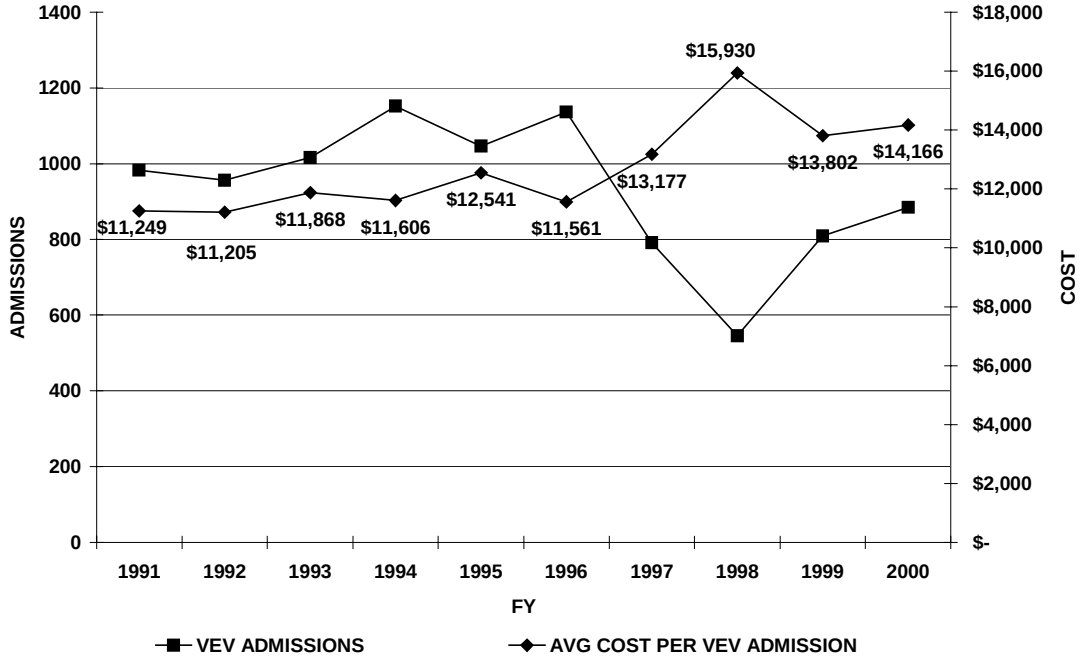


Figure Caption

Figure 23. STVHCS ALMD Acute Care and Mental Health Product Lines combined admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

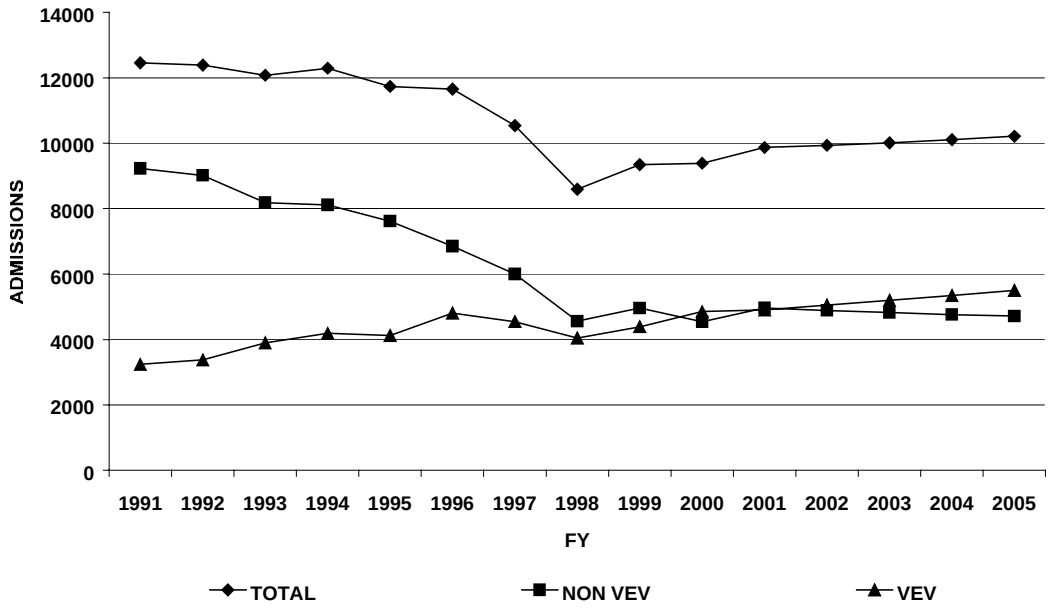


Figure Caption

Figure 24. STVHCS ALMD Medicine Service admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

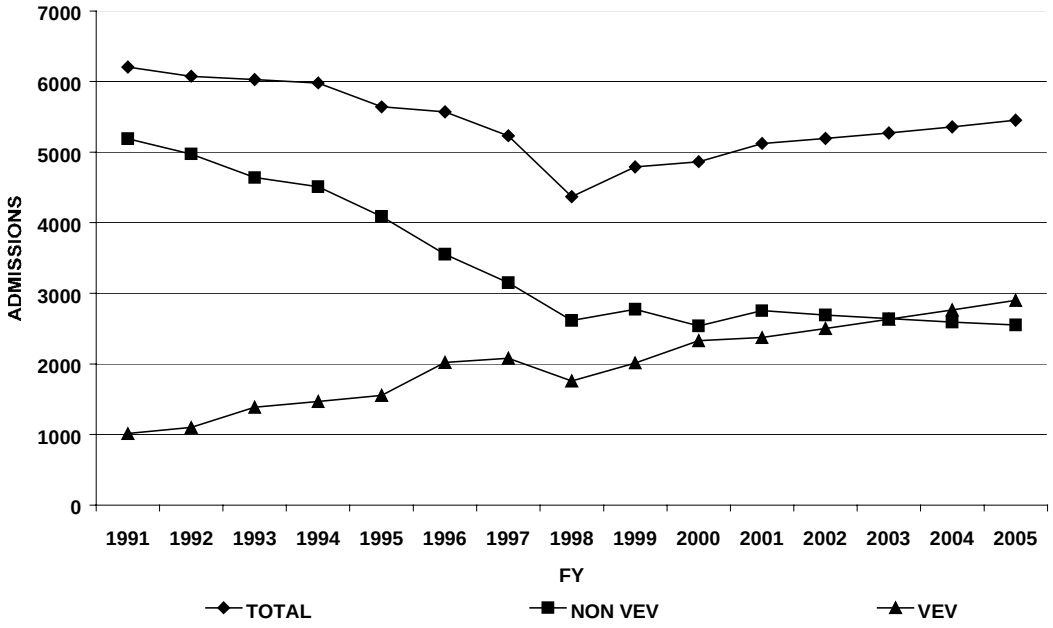


Figure Caption

Figure 25. STVHCS ALMD Surgery Service admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

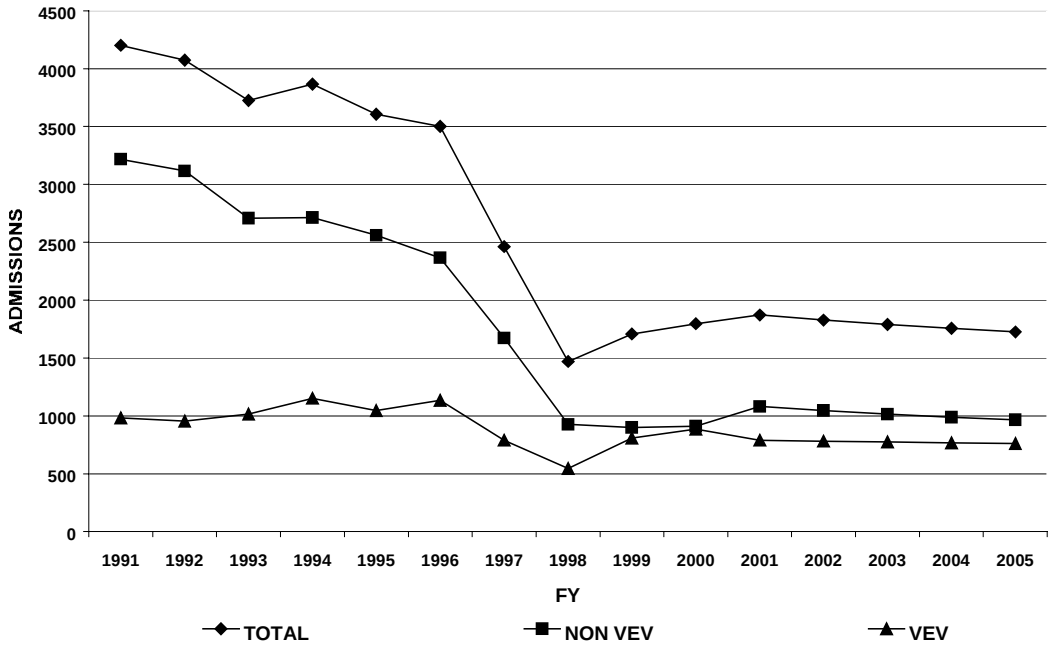


Figure Caption

Figure 26. STVHCS ALMD Mental Health admissions (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$)

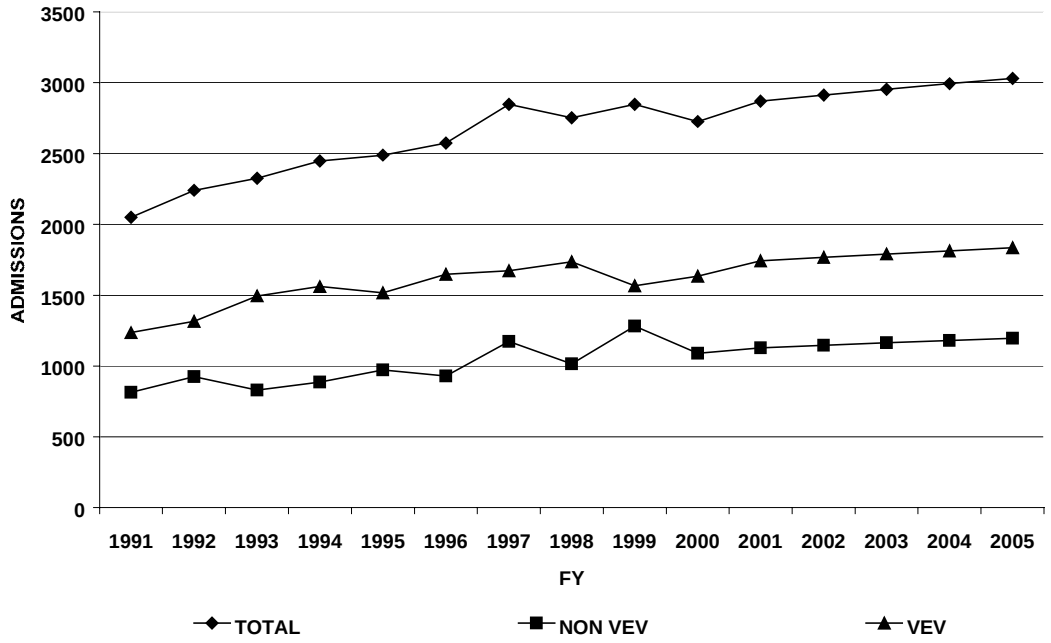


Figure Caption

Figure 27. STVHCS ALMD Acute Care and Mental Health Product Lines combined BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

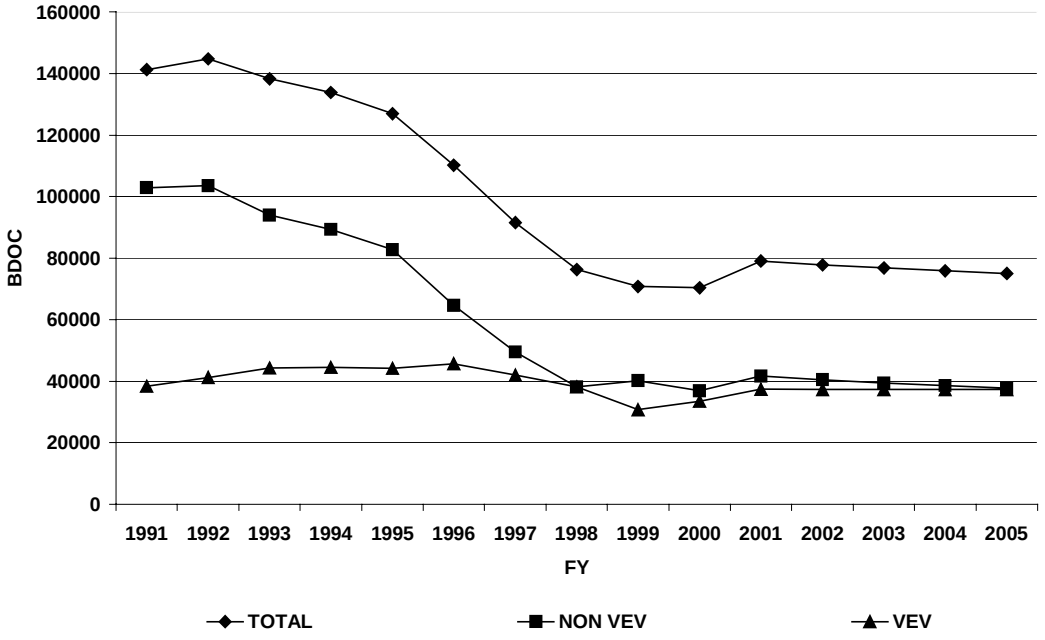


Figure Caption

Figure 28. STVHCS ALMD Medicine Service BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

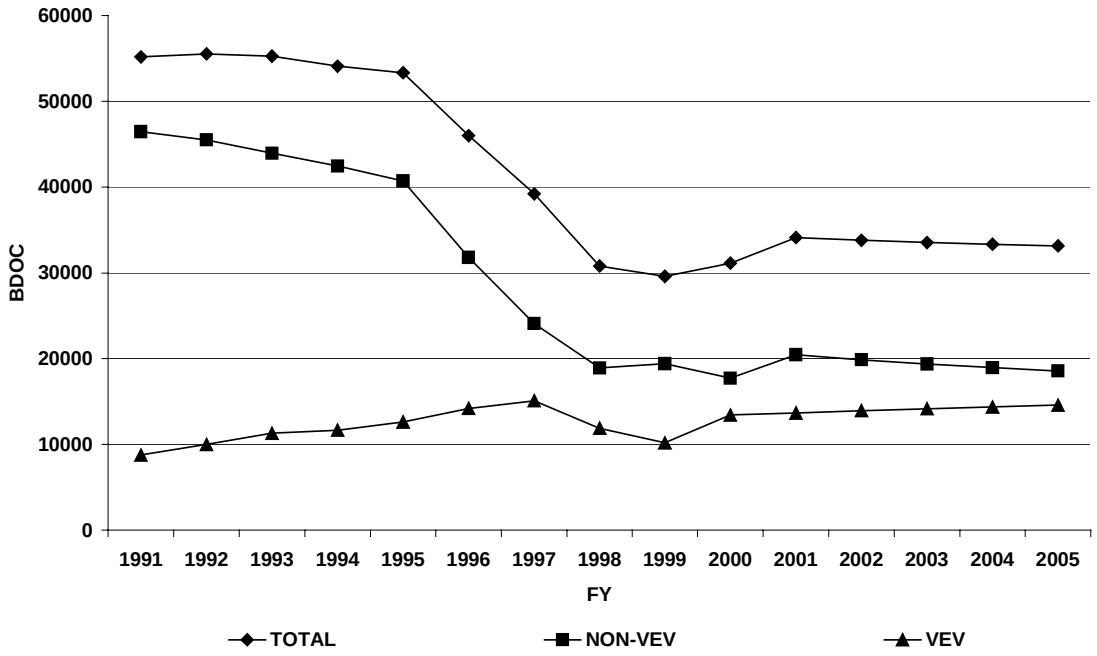


Figure Caption

Figure 29. STVHCS ALMD Surgery Service BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

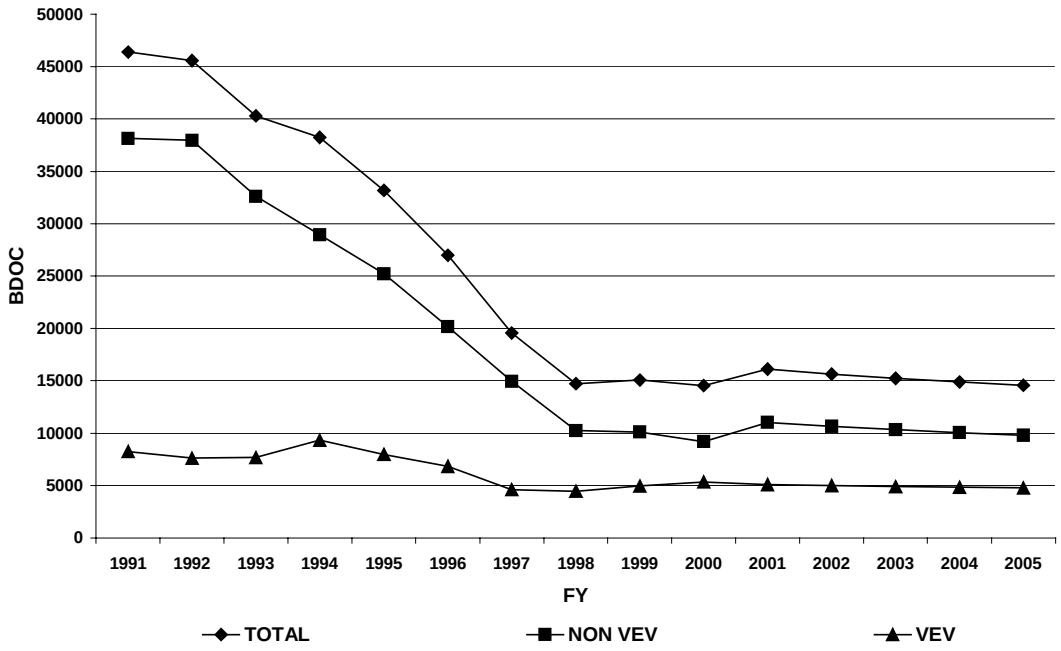


Figure Caption

Figure 30. STVHCS ALMD Mental Health BDOC (Actual FY 1991 – FY 2000 and forecasted FY 2001 – FY 2005 using inverse logarithmic calculation $\hat{y}_t = 1/(a + b\log_e t)$).

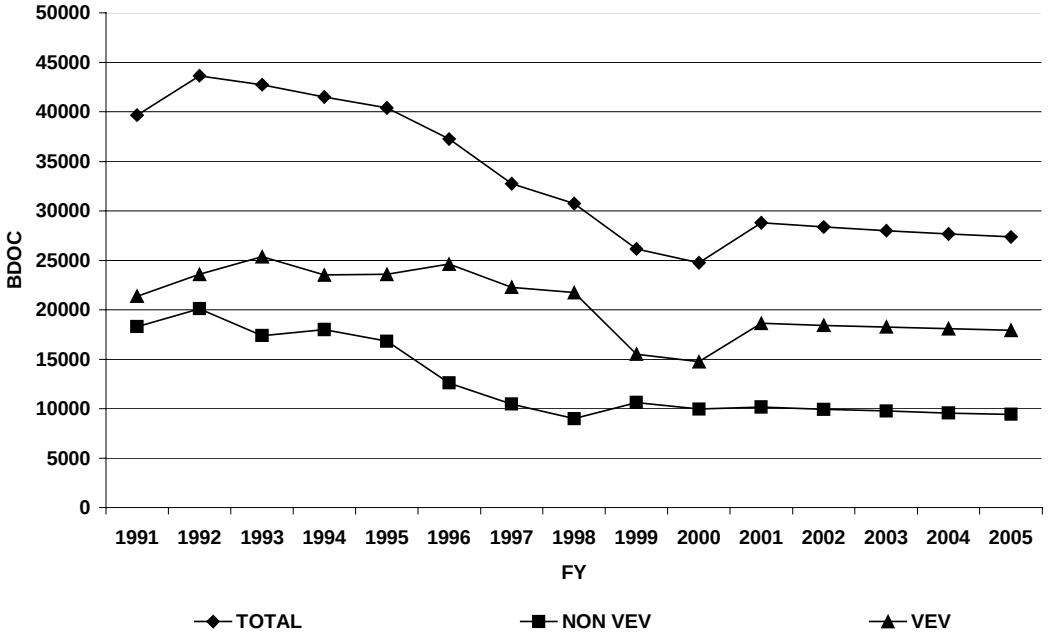


Figure Caption

Figure 31. STVHCS ALMD Acute Care and Mental Health Product Lines combined total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast).

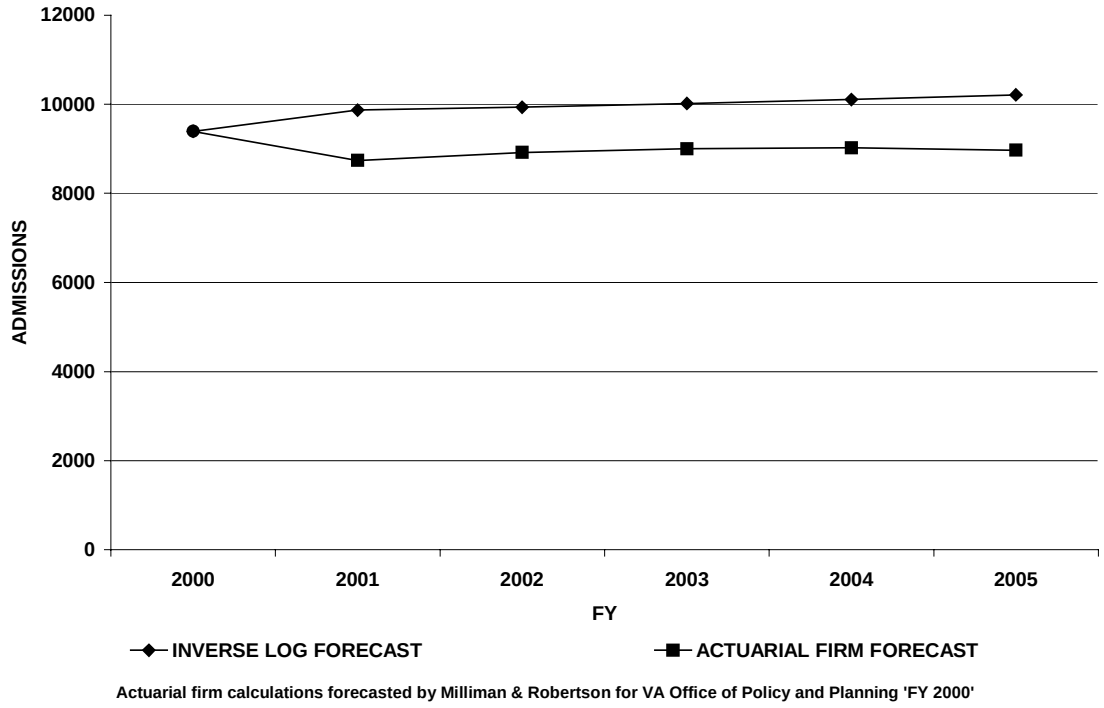


Figure Caption

Figure 32. STVHCS ALMD Medicine Service total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast).

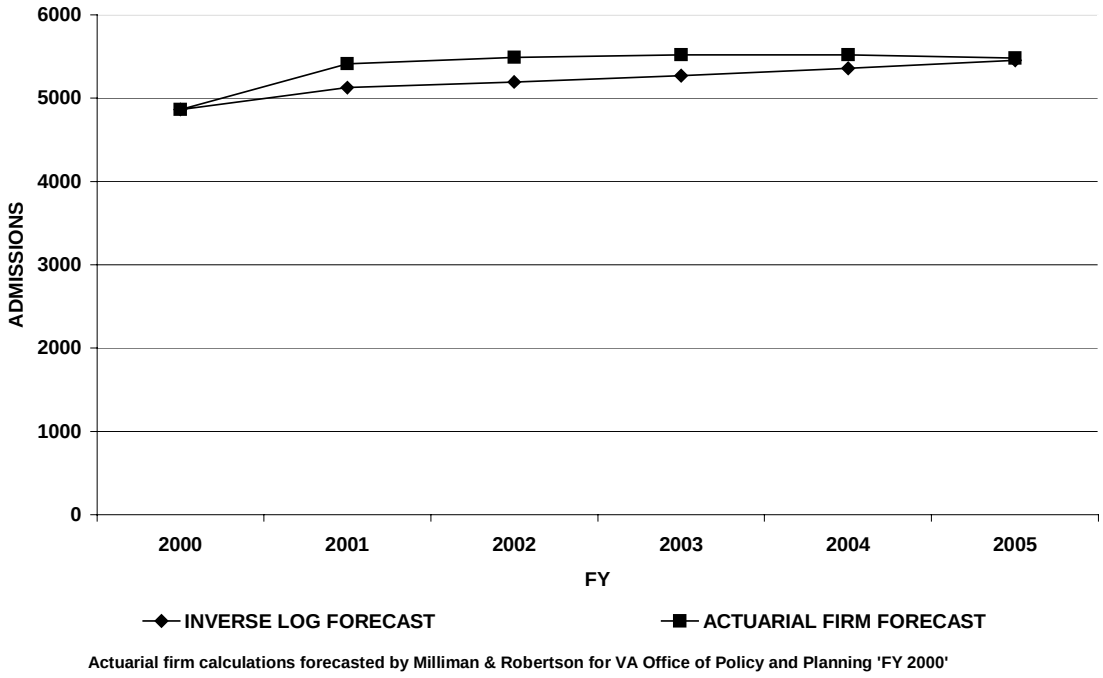


Figure Caption

Figure 33. STVHCS ALMD Surgery Service total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast).

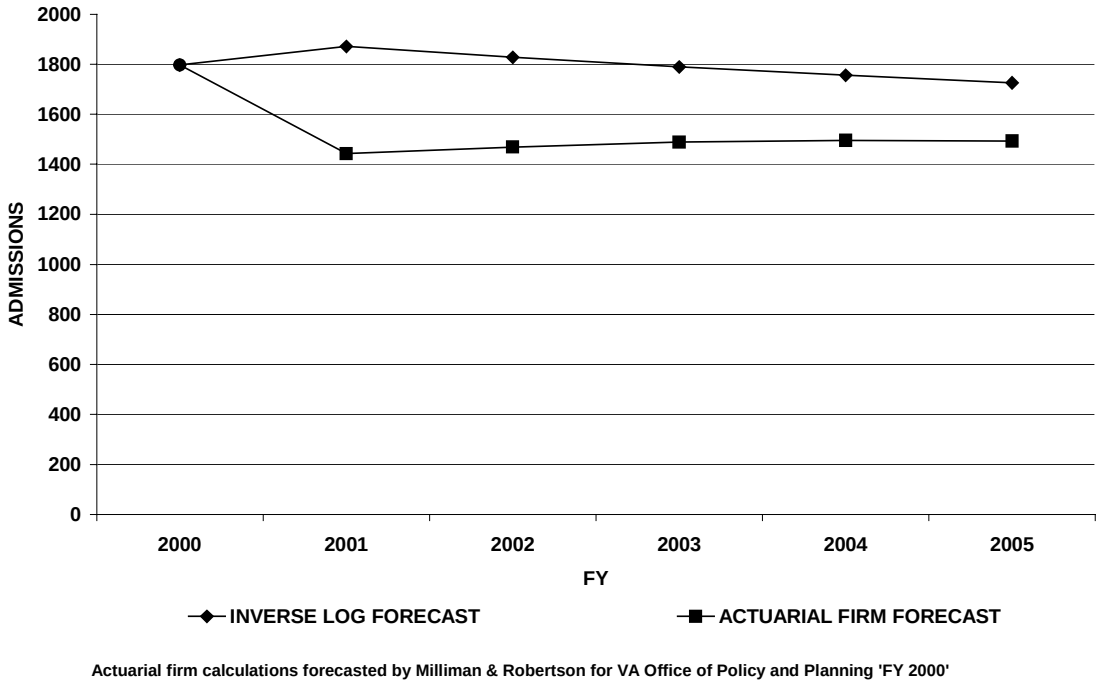


Figure Caption

Figure 34. STVHCS ALMD Mental Health total admissions forecast comparison, actual FY 2000 and forecasted FY 2001 – FY 2005 (Inverse log forecast compared to actuarial firm forecast).

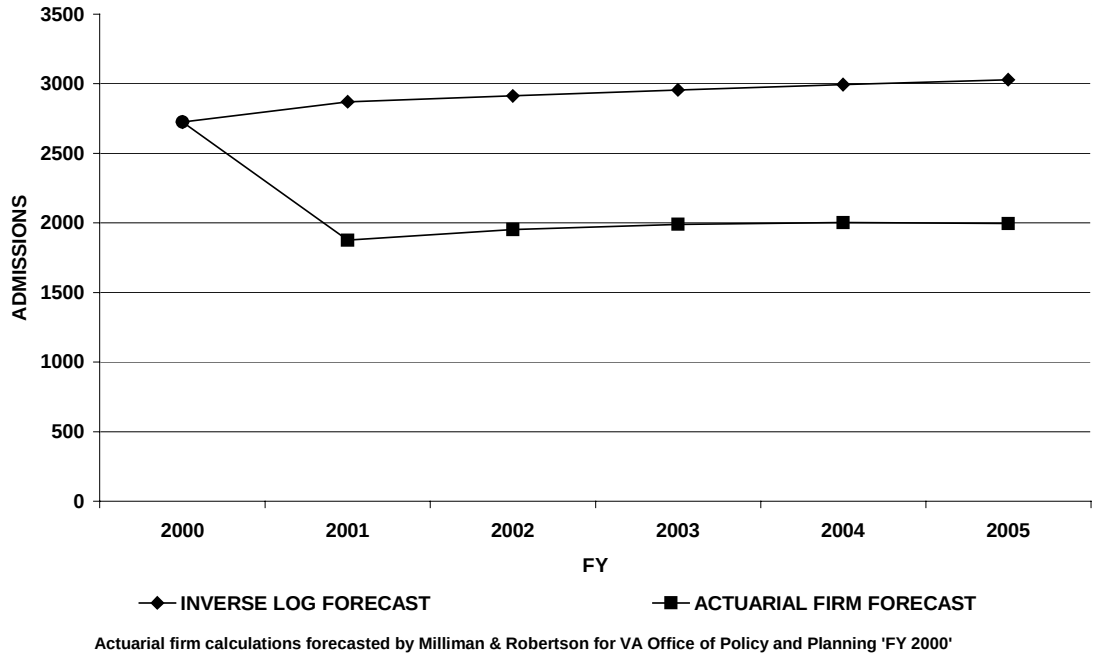


Figure Caption

Figure 35. STVHCS ALMD Average cost per VEV admission by service and combined totals, actual FY 2000 and forecasted FY 2001 – FY 2005 (Forecasted Cost Per Admission = Inverse Log Admission Forecast ∗ Prior FY + 6% Cost of Living and Inflation Increase).

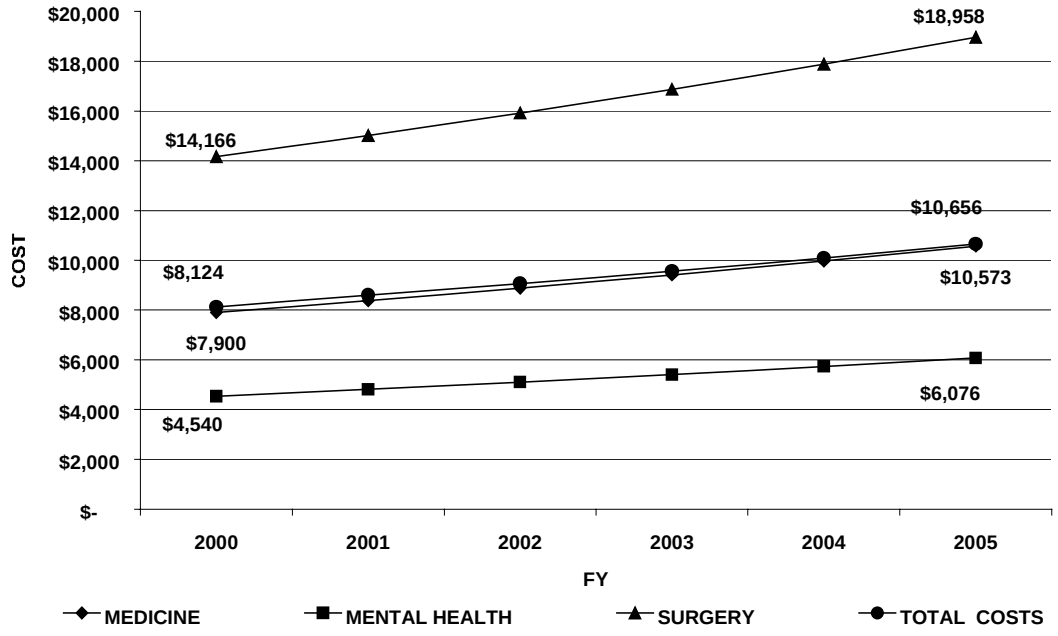


Figure Caption

Figure 36. STVHCS ALMD Acute Care and Mental Health Product Lines combined total VEV cost, actual FY 2000 and forecasted FY 2001 – FY 2005 (Total Forecasted Cost = Forecasted Cost Per Admission ∗ Forecasted Admissions).

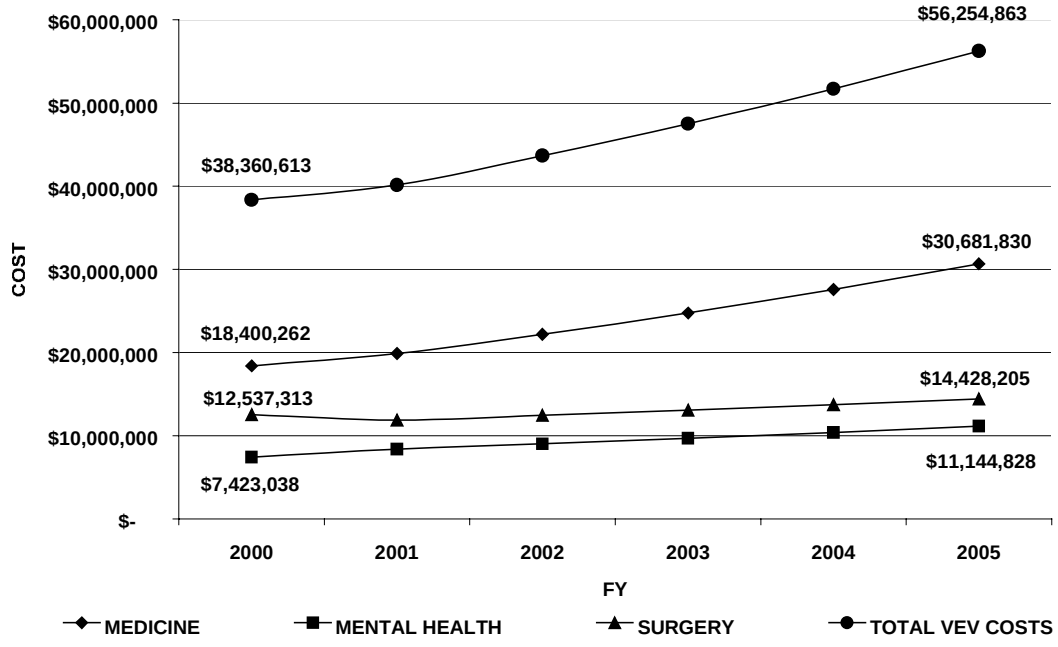


Figure Caption

Figure 37. STVHCS ALMD Acute Care and Mental Health Product Lines combined total inpatient cost, actual FY 2000 and forecasted FY 2001 – FY 2005 (Total Forecasted Cost = Forecasted Cost Per Admission ∗ Forecasted Admissions).